ELECTRICAL REVIEW

Vol. CXLIX 21st SEPTEMBER, 1951 No. 3852

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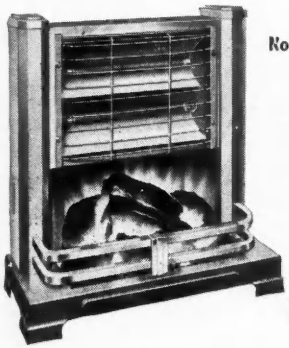

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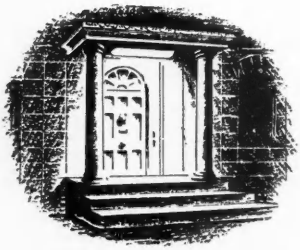

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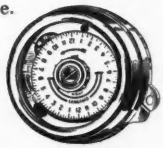

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ELECTRICAL REVIEW

Vol. CXLIX No. 3852 21ST SEPTEMBER, 1951

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Electricity Cuts

THE B.B.C. SHOULD HELP

THE precarious position of our electricity supply is constantly being brought home to us and those in charge at the British Electricity Authority have recently stated with even more vehemence than in the past that they view the approach of winter and the possibility of a severe one with the utmost anxiety.

Overload Warnings

Various methods which have been under consideration for giving warning of approaching overloads, however good they may be, must all be regarded as of no avail to ease our difficulties in the coming winter because time is too short for any effective installations to be made. There is an urgent need, however, for some means whereby industry and the general consumer can be given warning in advance of the risk of a breakdown which might well prove to be a major calamity.

In a national emergency such as this it should not be left to the resources of the B.E.A. alone to find a remedy; any service which can be called in to help ought to be made available in the national interest. The B.B.C. have co-operated in giving warnings from time to time of impending overloads, but verbal warnings of this kind we feel go largely unheeded by those who, from force of habit, may have the wireless as a background without being attentive listeners.

We have in broadcasting and the ubiquitous receiver a medium for this purpose, the value of which, in our opinion, is by no means adequately appreciated. It would not be too much to ask that in every factory and every industrial organization there should be a receiver permanently switched on to the appropriate B.B.C. frequency for the area ready to receive a district signal at any time and give warning to executives to take immediate action to reduce their loads.

Distinctive Signal

We do not suggest that the warning should take the form of a statement, mixed in with news or sandwiched between other items, but that there should be a break in the programme with an unmistakable signal imposed on the carrier for purposes of arresting attention. Something in the nature of an air raid warning would be ideal. If it is considered that that would be too startling some other signal of equal effectiveness could be used.

The interruption of the programme need not be long enough to be of any real consequence to the B.B.C. fare; it might well prove to be the means of

preventing a shut-down of broadcasting along with much else. It would be essential that factory and business premises should undertake to keep a " watch " (similar to that kept at sea) for this purpose and be prepared to act immediately the warning is sent out.

The B.B.C. seems to us to be sometimes inconsistent in its approach to this problem of the power supply position at peak hours. As an example, attention was drawn earlier this year in the *Wireless World* to the fact that television transmissions, which are creating a new load for the British Electricity Authority, and a rapidly growing one, have now been extended by lengthening the " Children's Hour " on week-days as well as Sundays during a period in which the highest peak load occurs during the six winter months. To have extended television hours over this period seems to us to show a lack of appreciation of the position. We hope that the B.B.C. will make amends by getting together with the B.E.A. now to tackle the problem in the way that we suggest.

PRIVATE PLANT

Views expressed by Sir Lynden Macassey on the subject of the B.E.A.'s attitude toward private generating plant (see our last issue) are supported by Mr. W. L. Boon, managing director of Powell Duffryn Technical Services, Ltd., in a letter to *The Times* of 13th September. Mr. Boon thinks that many more back-pressure or pass-out turbines could be brought into service if the Government and the B.E.A. gave encouragement. He attributes the lack of electric power to the shortage of boilers and generating plant and advocates the restriction of exports of boilers and turbines. It should be pointed out that in its 1950–51 report the B.E.A.M.A. denied that there was a shortage of generating plant and it would certainly appear that manufacturers are quite capable of meeting both home and export demands. Finally Mr. Boon does not agree that the B.E.A. should provide private generating plant; he prefers industrialists to make their own arrangements.

DIVIDEND LIMITATION

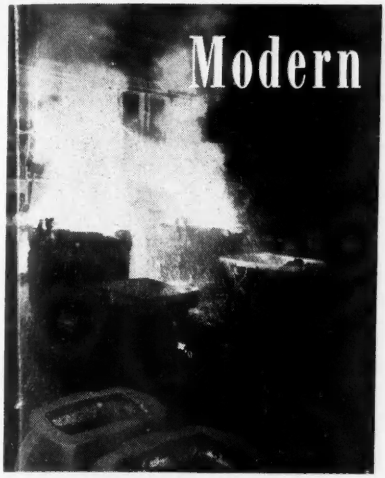
A further statement by the Treasury on the dividend-limitation proposals set out in the recent White Paper on the subject does little to settle the minds of the boards of those companies which will be affected. It is announced that the dividends paid to a parent company by wholly-owned subsidiaries will not be subject to limitation and that consideration is being given to certain cases in which dividend standards may be inappropriate. But, it is said, applications for exemption or special treatment on the ground of the existence of special circumstances will be considered on their merits only after the necessary legislation is in force.

SPARE-TIME WORK

There may be some justification for the National Coal Board's opinion that its employees can do what work they like in their spare time but when the work assumes the proportions revealed in the recent statement by Mr. Penwill, director of the Electrical Contractors' Association, it is inevitable that questions should be asked. The outstanding case seems to be that of two N.C.B. electricians who wired 60 council houses. So much work would take up a great deal of spare time; presumably the Council was in no hurry. But how did a local authority come to place such a contract with spare-time electricians rather than an established firm? Then who supplied the material and on what terms? The National Coal Board may profess not to be interested in these matters but other people are and would like them looked into.

EXPORTERS' SHORTCOMINGS

The imperative need for British exporters to ascertain conditions in overseas markets before sending out equipment is underlined by a letter received from Bermuda. In this Colony the supply is at 60 c/s but on frequent occasions equipment embodying 50 c/s motors has been supplied from this country, causing the customers a good deal of delay and trouble. Although our correspondent blames British electrical manufacturers, examples which he quotes indicate to us that the suppliers of, or agents for, the principal equipment are often to blame. When supplying equipment directly electrical manufacturers should certainly see that it is what the customer wants. They should also do what they can to ensure that those who embody their motors, etc., in other machines for export use the right types.



When tapped each furnace discharges via a bifurcated launder

Modern Steel Making

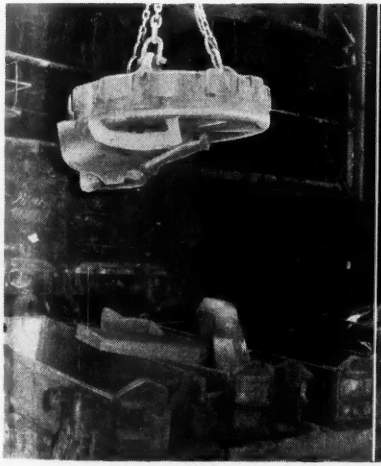
Reorganized Melting Shop in Large Steel Works

THIS description of the reorganized steel melting shop at the Consett works of the Consett Iron Co., Ltd., represents, in the order of works production, the last of the sections of this comprehensive reorganization scheme to be completed to date. Other sections of the works, each in effect a large factory on its own, were dealt with in the *Electrical Review* as follows:—Power station, 10th August; coke ovens, 7th September; and blast furnaces, 14th September. The rolling mills in the next section are likely to be completed in about a year's time.

The melting shop has three bays each about 1,100ft long, and the overall width is about 200ft. The three bays are a scrap stock bay on the west side, a central charging bay and a casting bay on the east side. The line of demarcation between the charging and the casting bays may be taken as the centre line throughout all eight furnaces which are aligned along the

Left: **Scrap is loaded from rail wagons to charging pans by crane-suspended magnets**

Right: **The scrap stock bay cranes have special beams for handling the charging pans; at charging stage level**



length of the building. With this conception the three bays may be regarded as of approximate equal width. The stock bay and casting bay floors are at about ground level, while the charging platform is about 30ft above this level. It will no doubt be best to tell the rest of our story by following the production processes.

Handling Raw Materials

The raw materials are scrap which is received in the scrap stock yard some considerable distance from the melting shop, pig iron castings from the stock pile referred to in the blast furnace article, and hot molten pig iron from the blast furnaces direct. The scrap metal is received in the stock yard by rail and is removed from the wagons and loaded into specially designed furnace charging pans by crane suspended magnets. These " Phoenix " magnets range in physical size from 64in to 74in diameter; they are designed for a normal working voltage of 200/220, but are arranged for operation through G.E.C. control gear giving a 250 V supply to effect a rapid build-up of the magnetic field. For the type of scrap being handled the lifting capacity is 2/12 tons. There are four 14-ton electric overhead travelling cranes, each having electrically operated motions as follows: hoist, 60 h.p.; long travel, 40 h.p.; and cross travel, 10 h.p. The crane span, i.e., the width of the enclosed stock yard, is 80ft, while the length of travel, the length of the stock yard, is 850ft. Some of the scrap in the stock yard is compressed into bales, for which purpose there are two two-way (horizontally and vertically upwards) hydraulically operated rams. The hydraulic pressure is provided by a Metrovick 50 h.p. motor driven pump, while other motors of this equipment serve the valve gear, etc. The loaded pans are brought to the scrap stock bay of the melting shop by rail.

All incoming materials to the stock bay, i.e., for steel melting, furnace fettling and construction—scrap iron and steel, pig iron, dolomite, silica sand, etc.—are handled by four 14-ton electric overhead travelling cranes with the following motor powered motions: hoist, 60 h.p.; long travel, 25 h.p.; cross travel, 10 h.p. All these cranes have special lifting beams for handling the pans which are loaded with scrap metal and pig iron. The pig iron is brought to the stock bay in specially designed 60-ton wagons, and two of the cranes are equipped for working with lifting magnets for unloading and loading the pig iron castings directly from the wagons into the pans. The magnets are similar in all respects to those in the stock yard.

The loaded charging pans are lifted by the cranes and placed on the charging stage, ready to be picked up by the furnace charging machines. The charging bay is equipped with five 3-ton seven motion overhead furnace chargers. The motions and their drives are as follows: slewing, 10 h.p.; tilting, 25 h.p.; bar turning, 10 h.p.; long travel, 25 h.p.; auxiliary travel, 10 h.p.; main hoist, 25 h.p.; and auxiliary hoist, 25 h.p. All these English Electric motors are served by Allen West drum type controllers. Devices on the end of the charger arm or bar and the end of each charging pan are locked so as to permit the bar to turn completely and so discharge its loads into the furnaces.

Hot metal from the blast furnaces is brought to the melting shop in 80-ton hot metal ladles. These are discharged into a 1,000-ton inactive hot metal mixer from which, as required, quantities are discharged into the steel melting furnaces by means of ladles. Above the 1,000-ton inactive mixer is a stationary overhead crane, i.e., a crane without long travel. It has cross travel and main and auxiliary hoists. For charging the mixer the ladle is lifted by means of the main hoist and

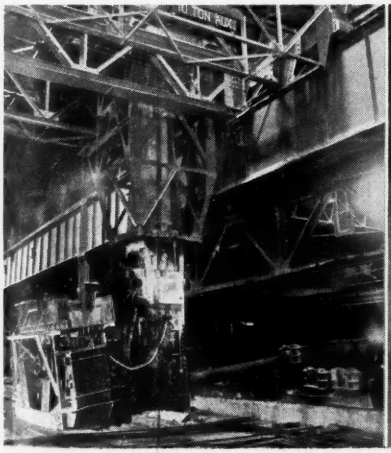
The charger motors are controlled by drum type traction starters

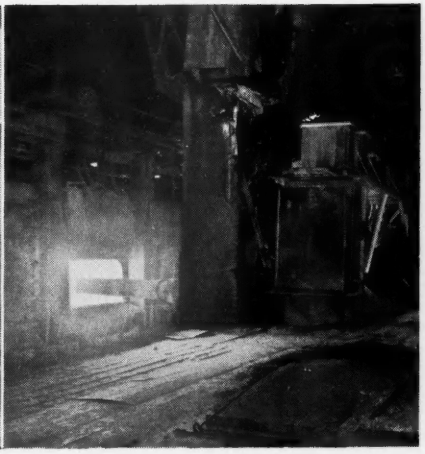
The overhead furnace chargers each have seven motor powered motions and are supplied electrically from a bare conductor and pick-up distribution system ; furnaces aligned roughly down centre of melting shop

tilted by means of the auxiliary hoist. When molten metal is required for the steel furnaces the mixer is tilted by its own tilting motor of 80 h.p. through a very wide ratio speed reduction gear, and the metal is allowed to flow into a ladle which is used to transfer the metal to the steel furnace. All the controls for the mixer and the associated crane are on the mixer platform.

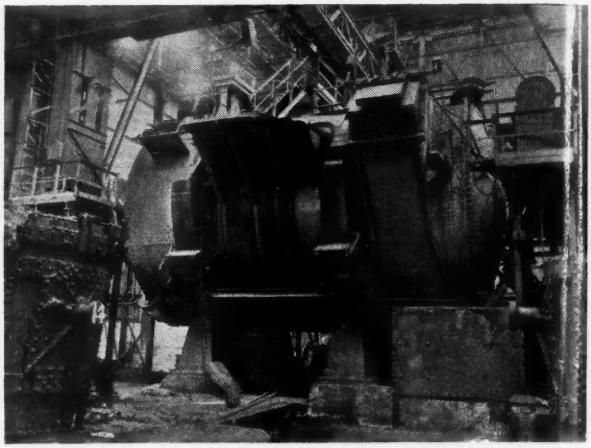
The eight Siemens open hearth furnaces —seven of which are of 150 tons capacity each, while the other one has a capacity of 80 tons—are fired with coke-oven gas and tar. One of the furnaces is normally out of action for repairs. The furnace charging doors at the back or west side of the

The charger engages the pans at the edge of the stage. *Right :* **The charger rod and pan are locked so that the pan may be turned over in the furnace**





furnaces are operated by motor operated winches mounted above door level on the furnace front. There are three doors per furnace and each door has its own winch, which is driven by a 2 h.p. L.D.C. motor. The motors are remotely operated from a control station at the charging stage level opposite each furnace, so that the operator has full vision of the charging operation. These squirrel-cage machines are directly started and the control gear consists of Allen West push-button contactor units.

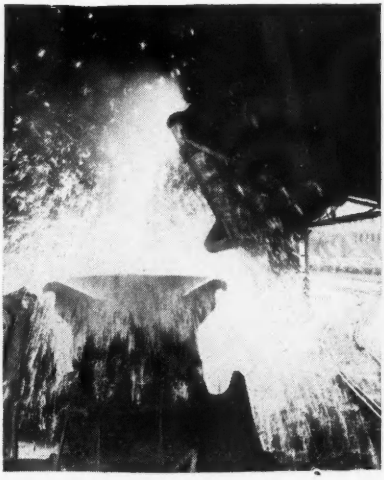


The 1,000-ton inactive hot metal mixer is tilted by a 80 h.p. motor

Each furnace has a refractory lined bath of about 47ft long, 16ft wide and 3ft 3in deep, with a gas burner at each end, so that firing can take place alternately from either end of the furnace. Underneath the bath are two honeycomb brickwork heat exchangers, through which, alternately, the incoming air passes for preheating and the outgoing gases from the furnace proper pass to heat up the honeycomb. Thus, while one exchanger is being heated the other is being cooled.

The valve reversing gear which permits the firing of the furnace from alternate sides on a predetermined time cycle, is operated by remotely controlled equipment, driven by a 5 h.p. L.D.C. motor which

While supported by the 100 h.p. motor driven hoist, the 90-ton ladle is tilted by the 25 h.p. motor driven hoist

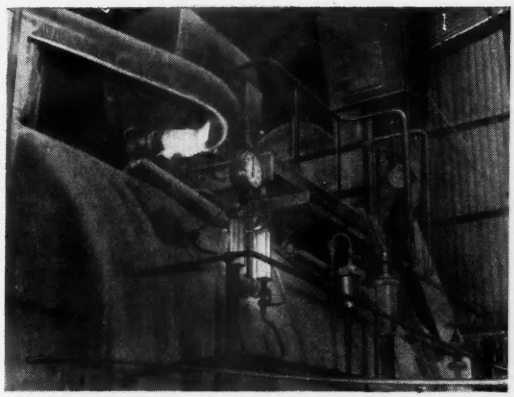


Teeming takes place into ingot moulds suitably placed on ingot cars

is controlled by Allen West push-button contactors. The motor driving the forced air fan is an 18 h.p. squirrel-cage L.S.E. unit. It is a variable speed machine with a very wide speed range, and it is controlled by Brookhirst contactor gear.

The controls for the valve reversing gear and forced air fan motors are all mounted with those for the furnace door winches to form one control station in each instance.

The outgoing gases from the furnaces are passed through waste heat boilers which are of the fire-tube type and are rated at 15,000–18,700 lb/hr, with steaming conditions of 160 lb/sq in and 550 deg F. There is an induced draught fan mounted on each waste heat boiler, and this is directly driven by an E.E. 125 h.p. variable speed, 500 V d.c. motor which is controlled by Brookhirst contactor gear. The i.d. fan discharges the gases to the shaft. The steam produced by the waste steam boilers is used for fuel atomizers for the steel furnaces, turbine driven gas boosters, heating of fuel line and storage tanks, tar pumps and general purposes. At the front or east end of the furnaces, i.e., in the casting bay, each furnace when tapped discharges via a bifurcated launder, thus permitting two ladles to be filled (poured) simultaneously. The launder is hinged and it is adjusted to the required level during operation by an E.C.C. 2·5 h.p. squirrel-cage motor served by Allen West push-button contactor type equipment.



Outgoing gases from the melting furnaces pass into waste heat boilers ; note 125 h.p. i.d. fan motor at top

For handling the 90-ton ladles in the casting bay there are four electric overhead travelling cranes, each of which is equipped with an auxiliary 25-ton crab and hoist for ladle tilting purposes. The motions and their drive are as follows: main hoist, 100 h.p.; long travel, 100 h.p.; cross travel, 25 h.p.; auxiliary hoist, 25 h.p.; and auxiliary cross travel, 10 h.p. All these English Electric mill auxiliary motors are controlled by Allen West equipment. There is a 10-ton general purpose crane in this bay which is also, of course, electrically driven. The molten steel collected in the 90-ton ladles is transferred into teeming ladles while on the 100-ton crane, by tilting by the 25 h.p. motor driven auxiliary hoist. Then teeming (pouring) takes place into ingot moulds which are suitably placed on ingot cars. The cars are stationary during filling or teeming operations, the ladle handling for which is done mainly by long travelling the ladle crane. The trains of loaded ingot cars are hauled to the stripping bays. All the crane motors are English Electric mill auxiliary equipments.

We are indebted to Mr. H. Boot, managing director, the Consett Iron Co., Ltd., for permission to visit the melting shop and to publish this article, and to Mr. F. B. George, director and works manager (development), and Mr. T. Coxon, consulting engineer, and members of the staff, for their help in collecting the information and photographs in this and the preceding articles.

Transductors

AN informative lecture on the theory and some of the uses of transductors, or magnetic amplifiers as they are sometimes called, was recently delivered by Dr. S. Frost-Smith, of Elliott Brothers (London), Ltd., to members of the S.E. London Branch (chairman: Mr. E. W. Summers) of the Association of Supervising Electrical Engineers.

The lecturer mentioned that the history of this device, which was replacing the thermionic valve for many industrial purposes, went back more than thirty years. He explained various kinds of circuit connections, feedback arrangements and formulæ employed for calculating types of transductor for specific purposes, a number of which were indicated by the lecturer.

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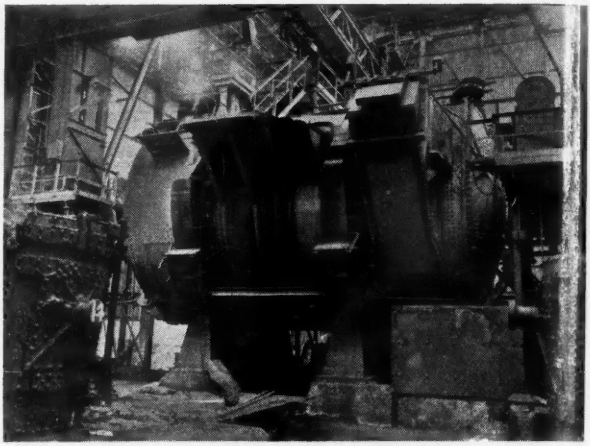

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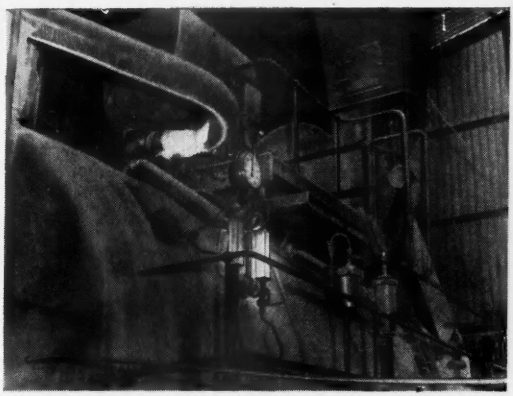

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VIEWS on the NEWS

By REFLECTOR

IT is apparently useless for the B.E.A. and Electricity Boards to keep on stating that it is not practicable to "dim the lights" as a prelude to load shedding, for the suggestion continues to be made. It turns up again in a letter to the *Sheffield Telegraph* in which the writer says:—"In Johannesburg over 50 years ago we had a time signal at 8 p.m. by reduced voltage which dimmed the lighting for two or three seconds" and he implies that it could be done here and now. Those were the days when the shift engineer used similar means to indicate to his wife that he was on the way home, but much has happened in the last half century in the way of electrical development.

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Something more arresting than hooters is sought by a town in the Midlands area for power cut warnings. Recently lifeboat signals were set off on the local football field and in ten minutes there was a 500 kW drop in the domestic load. However, the experiment was only partially successful, for many of the inhabitants failed to hear the warning. Now rockets are to be tried that are said to let out a screech lasting for several seconds. The town, I am glad to say, is a long way from my place of abode.

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Somebody who, I presume, is a potential "electrical contractor" writes to the journal *Mechanics* in the following terms:—

> "Without having to study the theory of electricity too deeply I am hoping that you will be able to give me some simple rule of thumb method of carrying out electrical installation. I am mystified over the various phases, fuses, switches, etc. Could you also recommend an elementary publication of a purely practical nature?"

The journal wisely replies that very few "rule of thumb" methods have general application electrically and it sounds a cautionary note. The warning is certainly necessary: serious trouble might result from the inquirer's confessed inability to distinguish between a phase and a fuse.

In the same journal another reader asks how he can adapt a 240 V cooker for use on 210 V mains. This time the reply is not so cautious. The reader is told that the removal of an eighth of the total resistance is involved. He is advised to remove a tenth "as a trial" and then take off some more if this proves insufficient. It is pointed out that "resistance wire tends to spring considerably when released" and this should be guarded against. I can imagine the reader having plenty of fun in carrying out his adaptation.

* * *

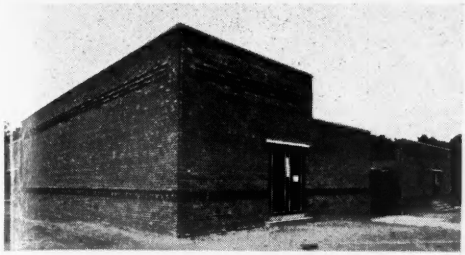
A proposal by the B.E.A. that it should erect six houses for employees engaged in the construction of the Portishead "B" station has been rejected by the Portishead U.D.C. The Council considers that the men should be accommodated in hutments and that these should be sited as near Bristol as possible, adding rather loftily that "the type of man using them would be more used to urban surroundings."

* * *

Glasgow newspapers report the impending disappearance of the city's "leeries." These, contrary to my first impression, are not a sort of civic ghost, but the men and women who light the gas lamps which still provide about a third of Glasgow's lighting. A proposal is before the Corporation that these lamps shall be superseded by electric lighting.

* * *

A picture appeared in the *Scottish Daily Express* recently showing "the sign the eels lit." The sign consisted of the word "Zoo" spelt out in over fifty lamps. My hopes of a possible new power supply were dashed by the subsequent notes. It appears that all these Edinburgh Zoo electric eels did was to produce a little energy which was put through an amplifier, the output from which operated a switch to put the lights on. It's a pity eels cannot do more; seaside illuminations by local eels would be a master stroke.



Castleton Substation

Official Inspection of New Supply Point for Rochdale Area

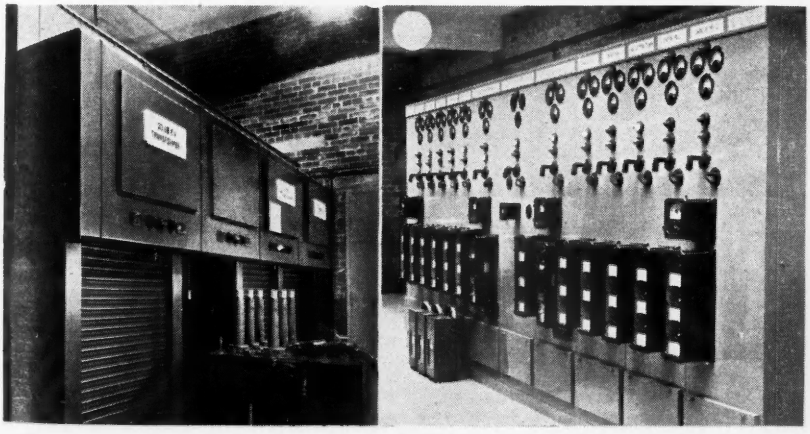
ON 10th September officials of Rochdale Corporation and members of the North Western Electricity Board inspected a new substation at Gypsy Lane, Castleton. Together with other supply extensions this new substation has strengthened and safeguarded the electricity supply to the Rochdale area. In the past the supply has come mainly from Kearsley, about 10 miles away, and to a lesser degree from Padiham, 15 miles away. It now comes from Chadderton generating station, only 6 miles to the south.

The grid has been extended from Chadderton and the supply taken to Castleton by an overhead double circuit line which will eventually carry current at 132 kV. Until the necessary transformers are available, however, the supply will be at 33 kV.

A feature of the substation is that the control equipment has been so designed that the station may function either unattended, or, in the future, be controlled by some supervisory system. On each switch control panel is an amber "discrepancy" lamp. On entering the station an operator illuminates the switchboards and if one of these lamps is lit it means that some automatic change has taken place on the switch equipment. When the station is attended, an audible alarm is given by means of flicker contacts on the circuit breaker energizing an alarm relay.

One main control switch is provided on each of the 33 kV and 6·6 kV panels for changing over from the local control position to the supervisory control position. At present there is no supervisory control

Left: **Section of 33 kV switchgear.** *Right:* **6·6 kV control and relay panels**



gear, but this switch and the necessary wiring are arranged so that it will be an easy matter to add the supervisory equipment at a later date. The latter gear can also be easily adapted to the tap changing control of the 33/6·6 kV transformers which enables the voltage of the supply to the 6·6 kV system to be controlled.

There is provision in the substation for four 33/6·6 kV, 10/12·5 MVA Ferranti transformers, two of which have already been installed. They are earthed on the 6·6 kV side through liquid resistors each capable of passing 1,000 A. They are fitted with fully automatic voltage control and line drop compensation is provided to overcome the resistive and reactive voltage drops in the distribution. The 33 kV switchgear, which has been supplied by the General Electric Co., Ltd., is of the single busbar, metalclad, 750 MVA, vertical drop down pattern. It is provided with bus zone protective gear of the current balance type with bias feature and neutral check.

The Ferguson Pailin 6·6 kV switchgear is of the compound filled, vertical isolation, single busbar, metalclad type. The protection is overcurrent and earth fault with the addition of "Translay" on the Dunlop No. 1 and No. 2 feeders. There is no bus zone protection.

The 110 V, 95 Ah operating battery, which is complete with automatic charging equipment, has been supplied by Nife Batteries, Ltd. The Pyrene CO_2 fire fighting equipment is capable of dealing with simultaneous fires in one 33 kV switch section, and either the 33 kV bus section or one of the 6·6 kV switch sections and bus section.

The substation is built on a reinforced concrete raft and has a U-shaped layout to shield the transformers from adjacent residential property. The structure is as low as possible, local facing bricks being used to harmonize with the surroundings.

Ministry of Labour Report

THE varied activities of the Ministry of Labour and National Service are covered in the Ministry's report for 1950 (Cmd. 8338, H.M. Stationery Office, 6s.).

In a chapter dealing with the labour supply position during the year it is stated that the staffing of some new power stations entailed the supply of extra workers to the electricity supply industry. The provision of highly skilled craftsmen for work on the programme for increasing the supply of electricity continued, as in other branches of engineering, to present a major problem, but by the end of the year 4,564 vacancies had been filled at firms making heavy electrical plant, leaving 1,070 outstanding. The supply of draughtsmen still presented great difficulties, the need being for men with several years' experience of mechanical engineering. To some extent the position was eased by the placing of a number of foreign draughtsmen.

Steady progress was maintained on the construction of some sixty new power stations or extensions and the number of workers employed at the end of 1950 was 15,000 as compared with 14,200 a year earlier. The labour force on the North of Scotland's Hydro-Electric Board's projects declined from about 8,000 to about 4,000, largely because some of the projects were completed or nearing completion.

In the electrical wiring and contracting industry employment continued at a high level during the year; there was little fluctuation in the total labour force, the average for the year being 70,000. On the whole, there was little unemployment in the industry, the average rate over the year being about 2 per cent.

A total of nearly 3,000,000 people were placed in employment during 1950, including 336,343 in "engineering, shipbuilding and electrical goods" (226,319 men, 28,254 boys, 70,065 women and 11,705 girls).

Vacancies notified to the Technical and Scientific Register during the year numbered 6,414 and 3,026 vacancies were filled (172 by women). At 11th December, 1950, 5,254 people remained on the register of whom 1,417 were unemployed and 3,837 were in work but seeking a change of employment.

Plastics Glossary

A GLOSSARY of terms used in the plastics industry (B.S.1755) has been published in time to become the basis for discussions by Technical Committee 61 (Plastics) of the International Organization for Standardization. The terms listed, all of which are fully defined, are grouped as follows: chemistry, industrial applications, constituents, properties, moulding processes and other manufacturing processes; an alphabetical index is included. This glossary is obtainable from the British Standards Institution, 24, Victoria Street, London, S.W.1, price 6s post free.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE 1951-52 session of the Institution of Electrical Engineers will open in London on 11th October, when **Sir John Hacking**, the President, will deliver his inaugural address.

Crompton Parkinson, Ltd., announce the appointment of **Mr. R. W. Taylor**, A.M.I.E.E., as product sales manager of the Nelson stud welding service as from 1st October. He succeeds Mr. R. V. Powditch who, as already announced, is taking over the position of product sales manager, f.h.p. motors. Mr. Taylor served an apprenticeship with the B.T.H. Co., Ltd., and was afterwards engaged in the company's sales departments for five years. Later he was director and works manager of Murwood, Ltd., and the Bejay Engineering Co., Ltd., and during the period 1938-45 was a senior technical officer of the Ministry of Aircraft Production and the Air Ministry. He was sales manager and director of the Power Equipment Co., Ltd., Hendon, from 1945 to 1948, subsequently becoming sales manager of Cyc-Arc, Ltd.

Mr. P. Scouller has been appointed manager of the Glasgow branch of Simms Motor Units, Ltd., in succession to **Mr. J. Ritchie**.

Mr. A. H. Horsfield, district engineer at Dewsbury for British Insulated Callender's Construction Co., Ltd., has retired after over thirty-seven years' service with the company. The occasion was marked by a presentation made at a social gathering attended by eighty of his friends and associates. Mr. Horsfield joined the former Callender's Cable and Construction Co., Ltd., in 1914, having previously served as mains engineer to supply authorities at Uxbridge and in Central Scotland. In the early part of the 1914-18 war his services were retained by the company for an important dockyard contract at Rosyth, but in 1917 he took a commission in the R.N.A.S. in which he served until 1919. In that year he returned to Callender's and for a time was employed on contract work in the Lancashire area. He returned to Yorkshire in 1920 and has been successively deputy district engineer and district engineer.

Mr. A. H. Horsfield

Mr. F. R. Mason, B.Sc.Tech., who since 1948 has been principal representative of the Metropolitan-Vickers Electrical Export Co., Ltd., at Trafford Park, has been appointed a director of that company. Mr. Mason joined the Metropolitan-Vickers Electrical Co. in 1926 as a college apprentice and later spent several years on power engineering work, during which time he spent a year with A.E.I. (India), Ltd., as technical representative. In 1938 he became engineer-in-charge of the paper-mill section, General Engineering Department, and he held this position until 1948, except for two years (1942-43) when he was seconded to the Ministry of Aircraft Production for work in connection with airborne electrical equipment; in 1943 he was attached to the British Air Commission in the United States. Mr. Mason was appointed a member of the I.E.E. Committee on Safety Regulations for Civil Aircraft in 1945, and a year later became chairman of I.E.E. Panels on various aspects of aircraft safety. He is vice-chairman of the M-V Overseas Association.

Mr. F. R. Mason

Mr. W. T. H. Dart has joined the London office of Crypton Equipment, Ltd., one of the L.D.C. group of companies, and has been appointed industrial sales engineer in the London area. Mr. Dart was previously with Siemens Bros. & Co., Ltd., Woolwich.

Mr. A. E. Bartram, chief clerk of the Turbine Construction Department of the British Thomson-Houston Co., Ltd., retired on 6th September after thirty-one years' service with the company. At a small luncheon party to mark his retirement, a presentation was made to him by Mr. A. S. Kettle, manager, B.T.H. Construction Department, in recognition of his long service with the company.

Babcock & Wilcox, Ltd., announce that **Mr. C. H. Davy**, M.I.Mech.E., has been appointed works director at the Renfrew and Dumbarton works. Mr. Davy, who has been chief research engineer of the company since 1932, was appointed a director in 1947. **Mr. I. M. Lyon**, B.Sc., M.B.E., M.I.Mech.E., will continue in his present position as general manager, Renfrew and Dumbarton works. **Mr. T. B. Webb**, B.Sc., A.M.I.Mech.E., has been appointed chief research engineer.

Mr. T. Lawson Noble, industrial consultant, tells us that he is shortly returning to Karachi from which city he will regularly visit the principal centres of Pakistan and India on behalf of a selected group of United Kingdom firms.

A dinner was held at the Bell Inn, Malmesbury, Wilts, recently to mark the fiftieth anniversary of the introduction by Mr. Alfred W. Beuttell, governing director of **Linolite, Ltd.**, of the double-capped tubular lamp and the system of continuous reflector-lampholders known as "Linolite." Among the visitors were Mr. F. E. C. Miller (a director of the Edison Swan Electric Co., Ltd., which company has been associated with Linolite, Ltd., as pioneers in the manufacture of these lamps), Mr. H. C. Weston (hon. secretary, Illuminating Engineering Society), Mr. E. W. Grote (managing director, British Electric Lamps, Ltd.) and Mr. A. R. McGibbon, who had been Mr. Beuttell's technical assistant on many lighting projects. The dinner was followed by a dance given by the directors and the Linolite Social and Sports Club. A specially designed 100 W Linolite desk light mounted with silver topped cut glass inkwells and silver pen tray, complete with silver pen and pencil, was presented to Mr. Beuttell by Mr. C. Gregory, the employee with the longest service (23 years). A feature of the proceedings was an exhibition tracing the progress of the inventions and of the company to date with an indication of future design.

Mr. A. W. Beuttell with Mrs. Beuttell inspecting the display of photographs at the Linolite exhibition

Mr. A. Shelton and **Mr. J. W. Reid** have retired from the board of Berry's Electric, Ltd. Mr. Shelton has served as a director for twenty-three years and Mr. Reid for seven.

Mr. J. J. Thompson

Mr. B. H. Killinger

Mr. J. J. Thompson, sales manager, and **Mr. B. H. Killinger**, Wembley works manager, have been elected directors.

At a Court of Assistants of the Worshipful Company of Farriers held on 11th September **Major George Appleton Warley**, F.C.A., was installed as Master. Major Warley is a director of the British Central Electrical Co., Ltd.

Mr. J. E. Chadbund, divisional works manager of the Brush Electrical Engineering Co., Ltd., Loughborough, was married at St. Peter's Church, Nottingham, recently to Miss Joyce Lynn Crofts, daughter of Mr. and Mrs. J. C. Crofts, of Manton Crescent, Beeston.

Mr. A. Earls, area manager for Cowal and Bute of the North of Scotland Hydro-Electric Board, has been appointed chief engineer of the Electricity Corporation of Nigeria and not the Nigerian Electricity Supply Cpn., Ltd., as stated last week.

The Amateur Dramatic Society of the **Benjamin Electric, Ltd.**, recently presented the one-act domestic comedy "Heaven on Earth." The cast included Rita Brown, Reg Brown, Iris Fuller, Doris Richards and Hale Stephens. The production was by Mr. and Mrs. Stephens and the scenery was designed and built by the Dramatic Society.

The Sloan Electrical Co., Ltd., recently held a sales conference of London and provincial branch and depot managers at the Howard Hotel, London. Lively discussions followed a comprehensive survey of the company's routine and marketing policy. The conference ended with a dinner at Kettners and a visit to "Latin Quarter" at the Casino.

Most delegates joined the Sloan Social Club on its annual outing to Clacton on the Saturday following the conference.

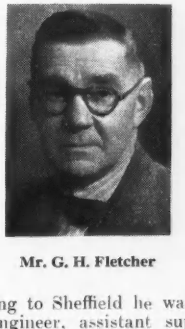
A horticultural show was held recently by employees of **W. T. Glover & Co., Ltd.**, Trafford Park, Manchester. The show attracted 370 entries, and the high standard of the exhibits was commented upon by the judges.

Mr. J. Bennett, A.M.I.E.E., chief designer of the Yorkshire Electric Transformer Co., Ltd., has been elected to the board. He was formerly a member of the senior design staff of the General Electric Co., Ltd., Witton, and earlier was with the Fuller Electric & Manufacturing Co., Ltd., and the English Electric Co., Ltd. **Miss P. Barratt**, secretary of the company for the past twenty-six years, has also been appointed a director.

The annual golf meeting of the **General Electric Co., Ltd.**, was made an Empire occasion on 8th September by the attendance of four competitors from overseas. They were Messrs. T. Lawson (South Africa), J. Gormly (New Zealand), E. C. Hindsley (West Africa) and G. W. Griggs (Burma). In spite of this, all prizes including the Australian cup and the Robinson-Rhodesia tankard, remained with the home organization. Mr. H. Nielsen, of Witton, won the Hugo Hirst trophy, with Mr. S. Barnes, of the Siemens & General Electric Railway Signalling Co., Ltd., as runner up; Mr. H. Pugh, of London Sales, won the veteran's cup; Mr. F. Thompson, also of London Sales, won the morning medal competition; Messrs. R. Priestly and J. W. Laing (Birmingham and Witton) won the greensome Stableford competition, with Messrs F. Garner and W. Trenholm (Coventry and Union Works) runners up; and Messrs. F. G. Quance and R. Priestly won the Australia cup and the Robinson-Rhodesia tankard respectively. At the end of the day's events the Hon. Mrs. Leslie Gamage presented the prizes. A dinner was later held in the Club House at Sonning.

Sir J. Donald Pollock, who is eighty-three, has resigned as chairman and from the board of Metal Industries, Ltd., and he has been succeeded as chairman by Mr. R. W. McCrone, one of the founder directors of the company. At the request of the directors Sir Donald has become hon. president of the company.

Mr. G. H. Fletcher, M.I.Mech.E., M.I.E.E., has relinquished his position as general manager of the Attercliffe Common Works of the Metropolitan-Vickers Electrical Co., Ltd., on reaching the retiring age. He remains in the company's service as consultant on the design of motors and generators for electric traction. He will also continue as director of the Metropolitan-Vickers Electrical Export Co. Mr. Fletcher, who received his technical training at the Victoria Technical College, Preston, and the Dick, Kerr Works, joined the company in 1914 when it was the British Westinghouse Co. and was responsible for the design of the company's first traction motors. When the manufacture of traction motors was transferred to Sheffield in 1922, Mr. Fletcher was appointed chief engineer. In 1930 he became manager in addition, being appointed general manager in 1949. **Mr. R. P. Knight**, A.M.I.E.E., who is appointed manager of the Attercliffe Common Works, joined the company in 1922 as a special trainee and in 1928 went to India as technical assistant to the company's resident engineer in charge of electric locomotive erection for the Great Indian Peninsula Railway. Returning to Sheffield he was successively a design engineer, assistant superintendent, assistant to manager, and assistant manager.



Mr. G. H. Fletcher

Mr. R. P. Knight

OBITUARY

Mr. James Ward, of W. T. Glover & Co., Ltd., died on 12th September, after a long illness. He joined the company in 1907 and for thirty of his forty-four years' service held the position of buyer.

Mr. R. G. Tyler.—The death occurred on 14th September at the age of eighty-eight of Mr. Ralph Gooch Tyler, M.I.E.E., chairman of Tyler & Freeman, Ltd. Mr. Tyler was educated at Hurstpierpoint and Cambridge (non-collegiate), and received his training with Alan C. Wylie and Ernest Scott & Mountain, Ltd., and had had his own electrical contracting business since 1898.

WILLS

Mr. D. Gray, C.A., former chief accountant of the County of London Electric Supply Co., Ltd., who died on 26th April last, left £11,122 gross (£11,029 net).

Mr. H. Brooke, formerly chief of the Technical Engineering Department of Allen West & Co., Ltd., Brighton, who died on 21st May last, left £15,893 gross (£15,776 net).

I.E.E. Chairmen

Provincial Centre Officers for 1951-52

IN our last issue we published biographical notes and photographs of the chairmen of a number of the provincial Centres of the Institution of Electrical Engineers. We now give below brief particulars of the chairmen of the remaining three Centres.

MR. A. L. ASHTON, B.Sc., chairman of the Southern Centre, is joint contract manager at the Eastleigh works of the Pirelli-General Cable Works, Ltd. He was educated at the High School for Boys, Trowbridge, Wilts, and after service in the 1914–18 war, attended the Merchant Venturers Technical College, Bristol University, graduating in 1921. He took up an

Mr. A. L. Ashton

Mr. E. C. Rippon

appointment in the Electrical Testing Department at Pirelli-General Cable Works, Southampton, in the same year, and subsequently held appointments in the Sales and Contracts Departments.

After supervising cable and overhead-line contracts in various parts of the country, he spent about fifteen years in London as resident engineer in charge of power cable contracts in that area, and during this period supervised the first C.E.B. oil-filled cable installations in the London and S.E. England area. Mr. Ashton remained in London until 1944 when he was appointed assistant contracts manager (power cables) based at the company's Eastleigh works. He was subsequently appointed to his present position of joint contract manager.

MR. E. C. RIPPON, chief transformer engineer with C. A. Parsons & Co., Ltd., is chairman of the North-Eastern Centre. He received his early training at Rutherford College of Technology, Newcastle-upon-Tyne, and as an engineering apprentice with C. A. Parsons & Co., Ltd., at Heaton works. He joined the Transformer Department of the company in 1931 and was appointed deputy manager in 1938. The reorganization of the department arising from its rapid growth led to Mr. Rippon's appointment as chief transformer engineer in 1947. He is vice-chairman of the Transformer Technical Committee of B.E.A.M.A. and represents Great Britain on the International Study Committee on Transformers, under the auspices of C.I.G.R.E. He also takes an active part, on the appropriate Transformer Committees, in the standardization work of the British Standards Institution and the International Electrotechnical Commission.

Mr. Rippon has contributed several papers to the I.E.E. and other bodies, a recent paper presented jointly before the I.E.E. being "The Detection by Oscillographic Methods of Winding Failures during the Impulse Tests of Transformers."

The new chairman of the Scottish Centre, Mr. P. BUTLER, is manager of the Transformer and Rectifier Departments of Bruce Peebles & Co., Ltd., Edinburgh. He was educated at Normanton Grammar School and Leeds University and obtained his early practical experience with Rhodes & Co., Ltd., Wakefield. During the 1914–18 war he served in the York and Lancaster Regiment, attaining the rank of captain. Joining the Metropolitan-Vickers Electrical Co. as a college apprentice, he made a special study of the development of transformers and later took up a position as a designer with the company. Since 1926 he has been with Bruce Peebles & Co., Ltd., and, after being appointed chief transformer designer, was ultimately in 1943 made manager of the Transformer and Rectifier Departments. He has written a number of informal papers and in 1940 installed the largest scheme for combined voltage and phase angle control in the country. Mr. Butler has made many business trips to the Continent and only recently returned from an extensive tour of Canada in the course of which he gave lectures to many public and industrial authorities.

Mr. P. Butler

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Floating Power Stations

I FEEL that recent references in the Press to the use of old ships and floating power plants derive in some measure from the published comments of mine on the classic paper entitled "The Economics of Electricity Supply" presented by Sir Henry Self to the British Electrical Power Convention at Harrogate in June, 1950.

In his massive review Sir Henry stressed *inter alia* the time taken and the high cost of site acquisition and preparation for power stations and in this connection made a special plea for standard construction. He laid emphasis on the high capital cost of plant and expressed misgivings about over-capitalization of the industry when we were thinking in terms of generating plant alone costing £60/kW. Moreover, in referring to the associated problem of the replacement of capital assets at more than treble their original cost, as distinct from the normal expansion programme, Sir Henry observed that: "The ideal would be to have slightly out-moded plant, that had been written off as far as capital is concerned which can be used for brief peak periods."

These were the considerations which prompted my remarks and, as there appears to have been some recent confusion of thought on the matter, it seems incumbent on me to point out that my summarized points on Sir Henry's paper referred in particular to "floating generating units" of a design that would lend itself to standard construction. The special objects of this proposal were stated to be the elimination of the site and civil engineering costs generally associated with a normal land station and reduction of the problem of housing the plant to one of simple standard mechanical construction.

Although the possibilities of using turbo-electric ships for augmenting (subject to certain limitations or modifications) shore electricity supplies must be apparent to anyone, my allusion to the turbo-electric vessel *Viceroy of India* was used in the context in a comparative sense as supporting the view that blocks of plant of 30 MW, or more, might reasonably be accommodated in the floating units.

My reference to "floating generating units" was deliberate and envisaged the use, by themselves or in combination, of less conventional types of hull than those of normal ships; indeed a floating dock type of construction was cited, with ample crane and workshop facilities for normal maintenance operations.

It was further suggested that the appropriate design must be a matter for ship designers and would be based on the essential requirements of the electricity system. For example, the normal pontoon flooding arrangements would be dispensed with as would also the normal portal jib cranes, to be replaced by a normal type of engine room traversing crane. A single span "blister" type of self-supporting roof would be required together with the closure of the ends of the structure with allowance for the admission of plant and stores.

Mention has recently been made of the maintenance of hulks in seaworthy condition, but these problems are well understood by marine engineers. Suffice it to say that the pontoons of a floating dock may be detached individually and serviced in the dock itself, in this way rendering a major overhaul of the hull unnecessary so that the life of the vessel would be as long as, or longer than, that of the installed plant.

There is little doubt that the policy of the British Electricity Authority of installing as much high efficiency base-load plant in as many land stations as possible is correct; nevertheless the claims of less conventional and cheaper forms of construction for peak load and emergency conditions ought not to be dismissed lightly. It may therefore be pertinent to again summarize

some of the merits of floating power units:—

(1) Avoidance of site acquisition and preparation entailing special provision of fuel handling and circulating water facilities.
(2) Saving in time and capital by standard mechanical construction of floating units.
(3) Lower operating costs due to ease of fuel handling and low pumping costs.
(4) Availability of substantial generating reinforcement to areas affected by dislocation or breakdown.

Since the operation of units in combination might make the use of coal a feasible proposition in certain circumstances, the more usual fuel would be oil and from the fact that diesel engines of the order of 10 MW capacity are to-day possible it would appear that groups of units of this capacity, or alternatively gas turbines, would be the more appropriate type of plant for the purposes outlined rather than steam plant. It should also be borne in mind that the local generation of kilovars, where required, would have beneficial repercussions on the stability and operation of the grid system.

Wolverhampton. O. H. Hosking,
Sub-Area Engineer,
Midlands Electricity Board.

Consultative Councils

Development in South West; Objections to Yorkshire Tariff

DURING the third year of the South Western Electricity Board's operation the number of kWh sent out increased by 204 million. This 14·6 per cent increase was equivalent to the total consumption in all the shops, offices and other commercial premises throughout the area in the previous year. These figures were given by the Board's chief engineer, Mr. G. O. McLean, M.Eng., A.M.I.E.E., in a report to the South Western Consultative Council on 10th September. He pointed out that to meet this additional demand and to give supplies for the first time to over 25,000 new consumers, about £3 million additional capital was expended, 148 miles of underground cable were laid, 396 miles of overhead lines erected (compared with 130 and 230 miles the previous year) and 500 extra transformers connected to the system (against 336). Not only was the amount of work carried out by the Board increasing, but the production rate was improving and economies were being achieved despite an increase in overall prices (material and labour rates) of about 40 per cent between 1948 and 1951. Standardization of design, equipment and methods and quantity buying had saved £80,000 a year in the building of 33 kV and 11 kV overhead lines. This and other measures were resulting in a saving of 10 per cent of the Board's annual capital expenditure.

The Board had been successful with certain experiments which were expected to result in savings of not less than £50,000. One of these was in the use of aluminium conductors for low-voltage mains, including house services, which would eventually result in a 30 per cent saving for this type of work.

Concern at the curtailment of rural electrical development as a result of the Government's decision to reduce the capital expenditure allocation of Electricity Boards in 1952–53 was expressed in a resolution which was passed by the Consultative Council. Mr. S. F. Steward, chairman of the Board, wrote that in the allocation of capital expenditure predominantly industrial areas would receive first consideration. In the circumstances the South Western Board felt that it would not be justified in initiating any more negotiations for rural development schemes. This meant that they must now halt the action they had pressed vigorously since nationalization. Pending clarification of the position the Board would not enter into any line rental agreements for rural distribution beyond those for which provision had already been made in this year's budget. The Council in its resolution considered that agriculture should rank equally with other sections of essential industry.

It was reported that following the representations made by the Council to the Central Authority on subvention or subsidy for rural development, a letter had been received from the secretary of the B.E.A. stating that the Authority was not prepared to take the matter up with the Government. It was a step which it felt would be more appropriate to the organizations concerned with rural interests.

Reply to Representations

At a meeting of the Yorkshire Electricity Consultative Council (chairman: Ald. W. Leach, J.P.) in Leeds on 12th September, a letter from the British Electricity Authority

was referred to in which the Authority rejected representations by the Council against the Yorkshire Electricity Board's proposed new standard domestic tariff. The Council's main objection was that some 575,000 consumers would be called upon to pay more, while only some 385,000 would pay less. It suggested that the profits being made by the Board should be used to reduce the number of consumers paying more, but the Board was anxious to hold any profits in reserve to counteract the effect of rising costs. In any case the Board has decided not to introduce any variations in the tariff before April, 1952.

The Council considered a number of applications from local authorities for an electricity supply to houses in villages already having supplies of gas. The Board stated that as a result of recent cuts in capital allocation, gas conversion schemes could not be proceeded with. Alderman Leach was able to inform the Council that the Board had just received a letter from the Central Authority advising them of a further allocation of capital for electricity supply to mining villages. He said that while the Council appreciated this provision, they were aware of the claims of the many rural areas still without either gas or electricity. Mr. Newey, deputy chairman of the Board, was not able to state which villages would receive supplies.

North West England Breakdown

B.E.A. Statement

THE British Electricity Authority has issued the following statement on the recent breakdown of supplies to the Merseyside and North Wales Area Board and the North Western Area Board.

At 4.57 p.m. on Monday, 3rd September, three heavily loaded grid connections supplying the Merseyside and North Wales Area and the western section of the North Western Area tripped in cascade following an unexpectedly rapid rise in load (as stated on p. 540 in our last week's issue). At the time of the occurrence all the available generating plant in the affected zone was operating at maximum output. There was adequate spare plant on the remainder of the system.

The tripping of the lines isolated the Merseyside and North Wales Area and the western section of the North Western Area from the remainder of the system, with a demand nearly 40 per cent in excess of the available generating plant capacity. The frequency and voltage in this isolated section fell rapidly.

Scotland also became isolated from the remainder of the system, but with sufficient generating plant to be self supporting. Load was shed extensively at the power stations in the Merseyside Area and the western section of the North Western Area in an attempt to hold the frequency. This was unsuccessful and the generating plant in the affected zone had to be taken off due to loss of auxiliary power, or instability. Local load restoration commenced as soon as generation could be resumed and was completed at 8.06 p.m.

The Authority has noted reports that a number of fires occurred on electrical apparatus in the Liverpool district following this fault. The Authority has received reports of only four refrigerator motors which burnt out in this district. As it had received reports of thirteen other refrigerator motor burn-outs in the same district during the course of the year, which could only be attributed to lack of maintenance by their owners, it considers that the breakdown was not the prime cause of the four failures reported on this occasion.

Factory Accidents and Regulations

THE annual report on Electrical Accidents and their Causes issued by the Senior Electrical Inspector of Factories (Form 929, Stationery Office, price 2s 6d) has made its belated appearance. These statistics show that during 1949 the number of reportable electrical accidents numbered 771, of which 24 were fatal, being a decrease of 9 in the total and a decrease of 19 in the fatalities.

Simultaneously, a memorandum by the Senior Electrical Inspector of Factories on the Electricity Special Regulations has been issued (Form 928, Stationery Office, price 3s). This fourth edition explains the effects of these Regulations, which refer to the generation, transformation, distribution and use of electricity on premises subject to inspection under the Factory and Workshops Act, together with exemptions allowed from them. This memorandum has been substantially revised and a new appendix added on the performance of apparatus under short circuit conditions.

Sale of Electric Tools.—Protest was made by Manchester ironmongers at a recent meeting against Electricity Boards selling electric tools, which hitherto had been considered the preserve of the private trader.

AUSTRALIAN NEWS

From Our Own Correspondent

GIVING evidence recently before the Federal Conciliation Commissioner in Sydney, a supervising engineer at Pyrmont power station said that he had the unpleasant duty of trying to get men working at the station out of hotels during working hours. The men went into the hotels during working time—usually when working on time-and-a-half or double time rates—and it was necessary to order them back to work.

The Electricity Trust of South Australia plans to spend £30 million during the next four years on plant and transmission equipment to meet the demand for power, which has been doubling every six years.

The Newcastle (New South Wales) City Council has applied for a loan of £600,000 for the Electricity Supply Department. It is estimated that another 4,000 consumers will be connected to the Council's system this year, and provision will be made for increased demand from existing users.

Tasmania plans to spend £8 million on hydro-electric projects, says Premier Cosgrove, and these projects are regarded by the Commonwealth authorities as a first priority.

Australia's defence and development projects were dealt a severe blow when damage estimated at £250,000 was recently caused by a fire in the Alexandria (N.S.W.) factory of the Lincoln Electric (Australia), Pty., Ltd. Fire destroyed large sections of the factory, which produces about half of the Commonwealth's heavy electrical equipment.

Revenue from the Perth Electric Tramways during the year to 30th June, 1951, was £671,715 compared with the £593,928 of the previous twelve months. Expenditure amounted to £771,963 compared with £996,612.

With threats that the Federal Government may class electrical appliances and radio sets as "luxury" goods and impose a sales tax of 66⅔ per cent, with restrictions on hire purchase and other credit purchases, the Federal Council of the Electrical, Radio and Telephone Manufacturers of Australia has stressed the importance of the radio and electrical industry to the country. The industry must be kept ready to play its major role in Australia's defence. It must, therefore, be permitted to continue to manufacture its essential peacetime commodities without disruption of production. Whether living standards are high or low depends upon the continued availability of such essentials as refrigerators, washing machines, ranges, hot water systems, domestic electrical appliances and the essential means of communication—radio.

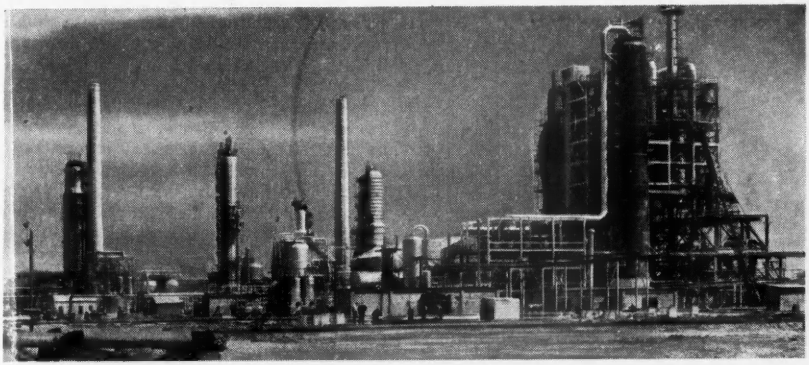
E.I.B.A. Activities

THE Birmingham Branch of the Electrical Industries Benevolent Association is holding its annual carnival dance at the Magnet Club, G.E.C. Works, Witton, Birmingham, on 12th October. Tickets (5s each) can be obtained from the hon. secretary, Mr. L. Wall, Electrical Components, Ltd., 102, Snow Hill, Birmingham, 4, or from any member of the committee. The annual general meeting of the Branch will be held at the Imperial Hotel, Birmingham, on Friday, 30th November.

The East Midlands area final of the National Golf Competition of the E.I.B.A. was held on 11th September at Notts Golf Club Course, Hollinwell. The winner of the medal competition was Mr. C. S. Littlewood, with a net score of 68, the runner up being Mr. S. K. Fletcher (score 71 net), Mr. R. B. White having the best scratch score (72 net). These names will therefore be submitted for the national finals to be held at the Southport and Ainsdale course on 25th September. The number of entrants for the competition was 104. In addition to the main event a 9-hole 4-ball bogey competition was held, the joint winners being Mr. J. N. Robertson (No. 1 Sub-Area manager, East Midlands Electricity Board) and Mr. J. B. C. Miller-Bakewell. The runners up were Messrs. H. Cantrell and I. A. Macdonald. As a result of these competitions it is expected that a sum of over £150 will be passed on to the Association.

Contract Price Adjustment Formulæ

THE following are the latest figures for use in the B.E.A.M.A. contract price adjustment formulæ:—Rates of pay: The rate of pay for adult male labour at 15th September shall be deemed to be 120s. Costs of materials: The index figure for intermediate products published by the Board of Trade on 15th September is 371·4 and is the figure for August.



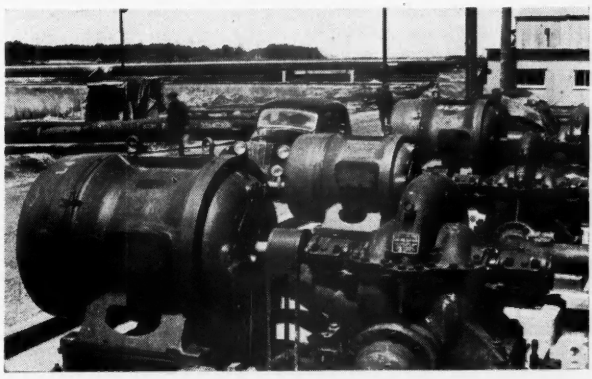
Fawley Oil Refinery

Electrical Features at the Largest Installation in Europe

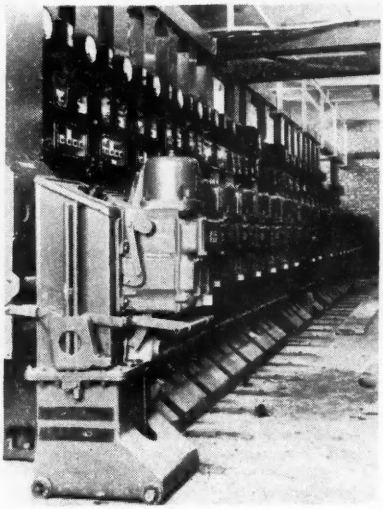
IN the seventh article in our series "Electricity in the Oil Industry" published on 5th January brief reference was made to the Esso Petroleum Company's new oil refinery at Fawley, near Southampton. Last Friday the first section of the scheme, which is costing £37½ million and is the largest in Europe, was officially opened by the Prime Minister, four months ahead of schedule.

Clearance of the site, which covers 450 acres, began in July, 1949, so that the installation has taken only just over two years to complete. When in full operation it will produce 6,500,000 tons of petroleum products annually and by the end of this year more than a million and a half gallons of motor spirit a day. Operating predominantly on sterling crude oil imported from Middle East sources, it will satisfy nearly one-third of Great Britain's need for petroleum products and will result in a saving in foreign exchange of more than 100 million dollars a year.

The major units included in the first section are two pipestills (crude distillation units), a catalytic cracker with light ends and polymerization facilities which will chiefly produce high-octane motor spirit; and an Edeleanu sulphur dioxide plant for reducing the sulphur content of kerosene and gas oil. What is believed to be the world's largest maintenance building—it is 800ft long and 180ft wide—has also been



Metrovick 500 and 600 h.p., four-pole TEFC flameproof outdoor motors driving De Laval pumps in the product loading station



Type KOB2 3.3 kV, oil-immersed automatic switch units installed in No. 1 substation (in course of construction)

provided, together with a complete railway siding and docks with a jetty 3,200ft long affording simultaneous berthing accommodation for four of the largest oil turbines afloat or contemplated, as well as smaller coastal tankers. In addition there is a comprehensive recreational centre, with fully equipped theatre, games rooms, etc. Among the items covered by the portion of the scheme due for completion by the end of 1953 are additional treating and sweetening plants for petrol, lubricating oils and tractor fuels. A sulphur extraction plant will make an important contribution to overcoming the existing severe shortage of that commodity.

Over 100,000 tons of steel have so far been used in the construction, as well as 300 miles of steel, cast-iron and concrete pipes, 200 miles of electric wiring, 100,000 cu yd of concrete, 12,000 valves and 220 pumps. At the peak period of construction more than 5,000 men were working on the refinery. The permanent staff will number about 2,500.

The approximate annual consumption of electricity will be 100 million kWh and the maximum demand 18,000 kVA. The refinery depends entirely on the Southern Electricity Board for its supplies and has no generating facilities. Alternative 132 kV supplies are received at the site from the B.E.A.'s Nursling substation and plans are in hand for a further source of supply later. Duplicate 15,000 kVA 132/11 kV transformers have been provided and these will be replaced as the demand increases by 20,000 kVA units to be supplied by the G.E.C. who have also been responsible for isolating and protective gear in the substation.

Most of the electricity supplied is absorbed by the various motors used for oil and water pumps, compressors, etc. These range in capacity from 1,250 h.p. downwards, there being a considerable number of between 400 and 600 h.p. Above 125 h.p. they are run on 3,300 V supplies, below 125 h.p. on 440 V. Only a very few synchronous units are employed and direct-on-line starting has been adopted almost universally. A load factor of 75 per cent has been achieved.

Originally the contract for electrical equipment was placed in the U.S.A. because it was considered that British manufacturers could meet neither the constructional programme nor the specification, which was based on American experience in the oil refining business. This view was strenuously opposed by the Metropolitan-Vickers Electrical Co., Ltd., which finally succeeded in negotiating a "blanket" agreement under which it undertook to supply all electrical equipment for phase "A" of the project (the portion just completed), except where equipment originally ordered in the U.S.A. was too far advanced.

The result of this agreement was that over 70 per cent of the electrical equipment for phase "A" was supplied by Metropolitan-Vickers, the remaining 30 per cent coming from I.G.E. America. This "blanket" agreement was later extended and Metropolitan-Vickers are now supplying all the electrical equipment for the second section of the scheme, phase "B."

Under the terms of the blanket agreement Metropolitan-Vickers provided a project engineer whose main function was to co-ordinate all the engineering work and to control deliveries to site, prices, etc.; the Standard Oil Company of New Jersey sent over an American engineer who worked in parallel with M-V for twelve months, assisting and approving on the spot Metrovick's interpretation of the American specification.

Apart from a variety of electrical apparatus, switchgear, transformers, motors, etc., which were installed during the preparation of the site for the project, the gear already supplied includes 132 kV and 11 kV switchboards, etc., installed in the Southern Electricity Board's substation (Metropolitan-Vickers undertook the erection of this substation) and five main-unit 11/3·3 kV substations, one of 10,000 kVA capacity (two 5,000 kVA transformers) and four of 5,000 kVA capacity (each with two 2,500 kVA transformers).

Each substation is a complete unit having 11 kV switchgear, two main transformers, 16- to 23-panel 3·3 kV switchgear boards complete with control panels, d.c. distribution boards, batteries, electronic battery charger, interconnecting cables, lighting, and other substation ancillaries. The majority of the switchgear is oil-immersed, metalclad type KOB2 or type KOC.

Of eleven secondary-unit 3,300/415 V substations, five are of 750 kVA capacity, two of 500 kVA, two of 300 kVA, and two of 100 kVA. Each consists of a 3,300/415 V outdoor transformer, interconnecting cables, and type AIR switchgear in tier formation.

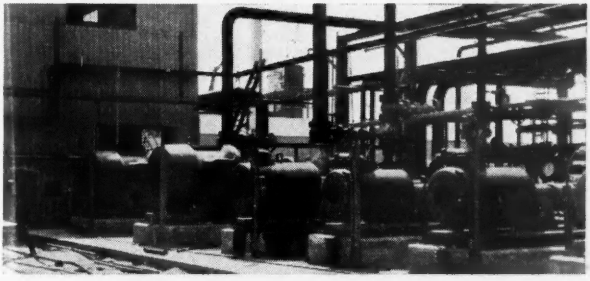
In view of the especial importance of ensuring continuous operation of the plant, each substation is provided with an automatic transfer scheme so that if a fault occurs on one bus-bar, a duplicate bus-bar is brought in automatically to prevent interruption of the supply. All switchgear is of the industrial pattern, the atmosphere in the substations being maintained at a positive pressure. The low voltage switchgear feeds turn-round (or maintenance) centres and motor control centres of special design, which facilitate speedy turn-round during the limited maintenance and repair periods.

Other items supplied by Metropolitan-Vickers are about 140 motors, the majority totally-enclosed, fan-cooled, flameproof, ranging from ½ h.p. to 600 h.p. and containing many parts of stainless steel and brass to minimize sparking and corrosion; distribution transformers, lighting panel boards, fibre and steel conduit, conduit fittings and instruments and about 3,000 items of lighting equipment.

500 kVA 3.3 kV/415 V, three-phase 50 c/s outdoor distribution transformer

Comprised in this lighting equipment are flameproof lighting fittings, specially constructed vapour type gauge glass and well glass fittings for use in semi-hazardous locations where fully flameproof fittings are not necessary (the vapour type fitting prevents infiltration of gas but is not designed to withstand the forces of an internal explosion), cast aluminium floodlights, fluorescent and incandescent street lighting fittings together with associated accessories such as poles, conduit, cabling and switches.

The large quantities of instruments required for indicating and recording pressure, temperature, flow, etc., were supplied by Short & Mason, Ltd., Foxboro & Yoxall, Ltd., the Taylor Electrical Instruments, Ltd., the Brown Instrument Co., and the Mason Neilan Regulator Co.



A range of 85 to 200 h.p., two- and four-pole flameproof outdoor squirrel-cage motors driving pumps in the blending area

Besides being responsible for the equipment of a 625 kVA substation for the administration block, the General Electric Co., Ltd., was entrusted with the whole of the interior lighting of the office and laboratory accommodation, including the medical wing; laboratories; canteen; clubhouse; gate house; and the deckmaster's building.

In the clubhouse semi-indirect fluorescent cornice lighting has been used with decorative tungsten fittings in all the social rooms, totally enclosed opal glass tungsten units being installed in the canteen. The administration building is equipped with 500 twin-lamp 80 W, 5ft instant-start fluorescent fittings for the offices, with 96 special 30 W fluorescent fittings in the corridors. Totally enclosed opal glass spheres are used in the janitor's room, filing room and similar offices. Twin lamp opal "Perspex" trough reflectors are generally employed in the laboratories, with special fittings in the titration chambers and in the soffit roofs of the fume cupboards.

Up to the present over 150 miles of paper, rubber and p.v.c. insulated types of "Ediswan" cables have been supplied for the scheme. P.v.c. insulated cable was specified for much of the permanent lighting and power installation because of its special qualities of resistance against the attack of oil, petrol and chemicals. These p.v.c. insulated cables, both armoured and unarmoured, have been used extensively.

The Edison Swan Cables Contracts Section carried the jointing of paper-insulated cables for all substations, transformers, and 3·3 kV motors, as well as the cables throughout the extensive temporary distribution scheme. A substantial quantity of the bare copper and cable accessories used at Fawley have been manufactured by Edison Swan Cables, Ltd. Bare copper wire and strand have been supplied for overhead lines and earthing, with wood poles, insulators, earthing rods and associated equipment, jointing materials, switch fuses, conduit, etc.

To ensure that every welded joint throughout the installation was up to standard, Foster Wheeler, Ltd., the main contractors engaged on the fabrication and erection, employed a "Raymax 250" 250,000 V industrial X-ray unit made by Newton Victor, Ltd. Since the nature of the work necessitated the use of the generator and the tube 60ft or more above the ground, the tubehead was enclosed in a special steel cradle. Despite this consistently satisfactory results were achieved in every kind of weather. Johnson & Phillips, Ltd., were responsible for the cables used for the welding and also for the power factor capacitors employed.

The reduction by four months in the estimated time taken to complete the refinery was due to a considerable extent to the ability to work a night shift made possible by the use of large numbers of Simplex "Reflecto-Flood" floodlights. Simplex flameproof equipment including conduit fittings and switches was also supplied on a large scale.

NEXT WEEK'S EVENTS

Wednesday, 26th September

LEEDS.—Great Hall, Leeds University. I.E.E. North Midland Utilization Group. Conference on "Electricity as an aid to Productivity."

LONDON.—Connaught Rooms, W.C.2, 12.30 p.m. for 12.55 p.m. Batti-Wallahs' Society. Luncheon. Address by Dr. Charles Hill.

Wednesday, 26th September, to Friday, 28th September

BLACKPOOL.—National Smoke Abatement Society. Annual conference.

Thursday, 27th September, to Sunday, 30th September

BOURNEMOUTH.—Institution of Electrical Engineers (Supply Section). Summer visit. Thursday, Assemble in the evening at the Burlington Hotel: Boscombe (headquarters). Friday: Visit to Southampton Docks, followed by dinner at Burlington Hotel as guests of the Southern Electricity Board. Saturday: Visit to Poole Generating Station. Sunday: Visit to Saunders-Roe, Ltd., East Cowes.

Thursday, 27th September

NOTTINGHAM.—Victoria Station Hotel. Illuminating Engineering Society, Nottingham Centre. Annual luncheon and induction of chairman.

Friday, 28th September

LEEDS.—Guildford Hotel, The Headrow. I.E.S. Leeds Centre. Chairman's address by J. Sewell.

Saturday, 29th September, to Thursday, 4th October

LONDON.—Empire Hall, Olympia. International Bakers' and Confectioners' Exhibition.

Coal Handling

Reclaiming Slack by Tractor with Bullgrader

SHORTAGES of fuel and risks of irregular deliveries have compelled most large users to greatly increase their stocks of coal. In consequence, the machinery provided for dealing with the stocking and reclamation of slack coal is tending, in some instances, to become inadequate.

By comparison with the usual types of drag scraper, overhead transporter and some forms of grab crane (which are static in a sense) the crawler tractor fitted with bulldozer or bullgrader equipment is completely mobile, physically smaller and relatively inexpensive.

Tests, which have produced some instructive figures, have been carried out at a large northern electricity generating station. The tractor used was an International Harvester TD.18 model fitted with Ruston-Bucyrus hydraulically-operated bullgrader equipment feeding from a stock pile about 15ft deep over a large area. The farthest coal was 320ft from the intake hopper, which delivered on to a belt conveying the coal to the boiler house. The belt was provided with means for weighing the coal, so the output was accurately determined.

Test 1—Pushing for one hour from 168ft each time:—

Pushing time av.
1 min 30 sec = 1·272 m.p.h.

Return high reverse
35 sec = 3·72 m.p.h.

2/4·992

Round trip av. = 2.496 m.p.h.

The number of trips was 28 and amount pushed 175 tons, or 175 ÷ 28 = 6·2 tons each push.

Test 2—Pushing for one hour from 312ft each time:—

Pushing time av.
2 min 20 sec = 1·52 m.p.h.

Return high reverse
1 min 5 sec = 3·72 m.p.h.

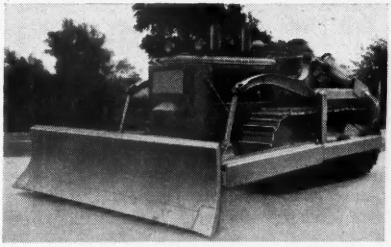
2/5·24 m.p.h.

Round trip av. = 2·62 m.p.h.

The number of trips was 18 and amount pushed 120 tons, or 120 ÷ 18 = 6·6 tons each push.

Test 1 shows that, although the distance was shorter than in Test 2, a slightly smaller output per push was occasioned by the fact that when the first hour started the stock was perfectly flat and level, but the operator quickly tried to make a trough or valley which would reduce blade end spillage and help contain a greater load. This object was properly achieved in the second hour, as for part of the greater distance the machine was pushing through the trough formed by the previous hour's working. This result brings out the importance of " trough pushing " to obtain high outputs.

A further test was made at a colliery where, just before holiday periods, it is necessary to load into railway wagons up



International Harvester TD.18 diesel tractor fitted with Ruston-Bucyrus hydraulically-operated bullgrader

Crawler tractor in operation at Stuart Street power station, Manchester

to 2,000 tons of slack coal for coke oven requirements over the holidays. The colliery made a stocking ground roughly 60 yd deep by 80 yd long which was elevated in relation to rail wagons, the wharf edge being just higher and overhanging 20-ton wagons.

The method of loading the latter was simply to push the coal over the edge into the line of waiting wagons along the wharf. The coal was slack with a certain amount of washery fines which was deposited through drop bottom wagons from an elevated railway supported on piers.

Test 3—Pushing from 168ft:—

Pushing time 1 min 8 sec = 1·70 m.p.h.
Return high reverse
35 sec = 3·40 m.p.h.
2/5·10 m.p.h.
Round trip av. = 2·55 m.p.h.

In this test not all the coal was pushed from the maximum distance, so it is only fair to say that the average push would be half of the maximum, namely, 84ft. The output was 780 tons loaded in 3½ hr, or 223 ton/hr, while 2½ to 3 pushes filled a 20-ton wagon; therefore each push was about 7 tons.

For earth excavation the TD.18 bullgrader blade capacity is taken roughly at 3 cu yd which, as slack coal is taken at roughly 12 cwt/cu yd, means in theory that this blade should only push 36 cwt. As the foregoing tests have proved, however, the push averaged 6·6 tons, or 11 cu yd, which greater quantity is occasioned not simply by the material being so much lighter than earth, but more particularly by the design of the angle of the cutting edge. The curvature of the bullgrader blade cuts and throws up the coal in a big curve, as shown by the photographs, which at times was 6ft high, or twice the depth of the blade.

It has usually been considered that where long hauls are necessary to recover coal, a box type scraper should be used behind the tractor, having a greater capacity than the bullgrader blade. The balanced size of scraper to match the TD.18 tractor would be a Ruston-Bucyrus model S.91 with a capacity of 8 cu yd flush and 10 cu yd heaped, but if this size scraper were used it would not be possible to get any more coal into it than 10 cu yd, or 6 tons. The tests mentioned have proved that the bullgrader moves 6·6 tons; therefore a scraper (unless a bigger one were used than the standard size) would be uneconomical as, quite apart from capacity, more lost time would be occasioned in manoeuvring the machine with a scraper.

Summing up, one can say that, in general, only bullgraders or bulldozers should be used for coal pushing. That being so, output calculations become simple and from the three tests we get the following round trip speeds and outputs:—

(1) 2·4 m.p.h. and 6·2 tons pushed
(2) 2·62 m.p.h. and 6·6 tons pushed
(3) 2·55 m.p.h. and 7·0 tons pushed

7·65 m.p.h. and 19·8 tons pushed

Average speed = 7·65 ÷ 3 = 2·55 m.p.h. and 19·8 ÷ 3 = 6·6 tons.

Allowing for continuous working, pushing slack coal, a very simple and safe statement would be that a TD.18 tractor with bullgrader will push 6 tons at 2 m.p.h. and, given the distance, a safe output is known.

In conclusion, a word regarding the layout of a storage area for coal bullgrading operations will not be out of place. It is obvious that the shorter the push the greater the output and, bearing this in mind, the best design

Pushing coal over colliery wharf-edge into railway wagons at Ferryhill: note large blade load of coal moved

of a stocking ground is a long rectangular area having intake points spaced regularly through the centre. An intake belt running in a trench over which intake hoppers and feeders are spaced at such intervals as to ensure a reasonably short push and large output would be ideal, with an overhead belt capable of discharging on to the ground at any point for stocking-out. From stock piles so placed a bullgrader, with equally short pushes, would place the coal out to stock.

Apart from the speedy and economical manner in which this machine does its work, another advantage is that the tractor crawls over the slack coal, so consolidating it as to reduce air voids. Thus the risk of spontaneous combustion is lessened, allowing a greater depth of coal to be put on the floor with safety.

The tests on which the output figures are based were organized by Mr. J. W. Aspdin, director of J. C. Oliver, Ltd., Leeds. They took place at the Stuart Street power station, Manchester, and the Dean & Chapter Colliery at Ferryhill. Other machines are operating experimentally in the way mentioned at the following power stations: Kirkstall near Leeds, Mexborough near Doncaster, Neepsend at Sheffield, Barton near Manchester and the Mersey station at Frodsham near Warrington.

Radio for the Fishing Industry

SELECTED items of radio communication equipment and navigational aids suited to the needs of the fishing industry are on the stand of the Marconi International Marine Communication Co., Ltd., at this year's Grimsby and District Industries and Trades Fair in the Augusta Street Barracks (19th to 22nd September). The "Oceanspan" medium and short wave telegraphy transmitter is widely used among distant water trawlers carrying a qualified radio officer, while the "Seagull" radiotelephony transmitter/receiver, which can be operated by the skipper, provides speech communication with other boats and G.P.O. coast stations. Between these comes the "Transarctic" for both speech and Morse communication. This transmitter/receiver, designed primarily for fishing and coastal craft, can be operated from the wheelhouse or other convenient position by means of a compact weatherproof remote control unit. Another transmitter/receiver is the "Seaphone" v.h.f. radio/telephone. Aids to navigation on show comprise a "Lodestone" direction-finder and "Seagraph" and "Seavisa" echometers. The "Seagraph" and "Seavisa" are incorporated in an animated display demonstrating how soundings are obtained and fish shoals observed. In addition to equipment displayed on the stand, the Marconi International Marine Communication Co. is providing a comprehensive public-address system, based on the "Oceanic" sound-reproducing equipment fitted in many trawlers for entertainment and announcement purposes.

Centralization Problem

THE sixth and seventh of the series of studies of nationalized industries sponsored by the Acton Society Trust, Acton House, Church Road, Claygate, Surrey, deal with the extent of centralization in these industries. The discussion is based on a "case study" in the coal industry because that industry is probably accused of over-centralization more frequently than any other and because preliminary inquiries suggested that the problems of balancing central control and local initiative would be brought out more clearly in this case.

A useful summary is given of the general case for centralization and its particular application to the coal industry. The ensuing matter, carried into the second study, contains much that may interest the electricity supply industry. The general conclusion is reached that "decentralization is not simply an aim which can be achieved by organizational changes, but is primarily a problem of the adjustment of human relationships.

These studies are available from the Acton Society Trust at 2s each (or 21s for the series of twelve).

Register of Industrial Premises

IT was announced by the Board of Trade on 29th July that the Government had decided to create a small organization within the Board of Trade under Sir Philip Warter which would be responsible for the establishment of a Control of Factory and Storage Premises in the event of an emergency. This organization is now the Factory and Storage Premises (Defence Planning) Division. As one of its first tasks the Division is bringing up to date its register of industrial premises, and industrialists will shortly be asked to supply certain basic information about their premises. By limiting the approach to firms occupying a floor space exceeding 5,000 sq ft, and omitting those industries which are already heavily committed to the rearmament programme, only about one-third of the industrialists throughout the country will be asked to complete a short questionnaire. The information will be regarded as strictly confidential and will only be used for the purposes of the register as an essential part of the country's defence plans.

Public Lighting Engineers

Annual Conference at Brighton

OVER a thousand delegates from local authorities and Electricity and Gas Boards throughout the country have this week taken part in the annual conference of the Association of Public Lighting Engineers which closes to-day (Friday) at Brighton. There have also been many visitors from overseas at the various technical sessions at the Dome. Delegates have had the opportunity of inspecting the latest street lighting fittings and columns erected along Madeira Drive for the period of the conference (reference to the display was made in last week's issue, page 529).

Mr. H. Pryce-Jones, the new president

On Tuesday morning, following the annual general meeting, Mr. H. Pryce-Jones, manager of the Mid-Sussex Sub-Area of the South Eastern Electricity Board, was inducted as president, and the conference was then officially opened by Alderman E. Simms, Mayor of Brighton. In the evening there was a civic reception followed by dancing in the Royal Pavilion and on Wednesday evening the delegates took part in a coach tour of the lighting installations in Brighton and Hove. The Hotel Metropole was the venue for the annual luncheon on Thursday and in the evening there was a reception by the president and Mrs. Pryce-Jones, followed by dancing at the Corn Exchange. The social events conclude to-day with a coach tour through the Sussex countryside.

In his presidential address Mr. Pryce-Jones said that the number of road accidents each year was about 250,000, many of which took place after dark, and it was impossible to avoid the conclusion that the number could be substantially reduced by better and more uniform lighting.

He agreed with a member who spoke strongly at last year's conference against too rigid and intensified standardization in street lighting practice. Although variety was said to be the spice of life, there was undoubtedly too great a range of lighting equipment in common use. The periodical exhibition associated with the conference bore evidence of this in, for example, the surprising number of alternative shapes of columns. A closer measure of aesthetic agreement could easily be reached with economic advantage to all. Similarly, with lanterns simplification could be achieved by a reduction in variety which, in its turn, should bring a lowering of initial and maintenance costs. This would provide more money for research with a consequent further improvement in the quality of the product.

One of the most frequent criticisms by the road user was the variety of colours of light and types of lantern used along adjacent sections of the same road. This was a source of danger and Mr. Pryce-Jones hoped that the rapid development of the fluorescent lamp, or the intelligent extended employment of lanterns using tungsten filament lamps, might ultimately eliminate the present colour difficulties associated with sodium and mercury light sources. In the meantime agreement could be reached between adjacent lighting authorities whereby changes in the type or colour of lighting could be made less abrupt.

After suggesting various ways in which the Association could contribute towards better lighting in this country, he said that during the past year it had made steady progress. There had been 96 newly elected members, bringing the total membership to 617. The revision of the articles of association whereby the nationalized gas and electricity industries and manufacturers became eligible for full membership had greatly strengthened the Association and broadened its field. On the educational side, work was proceeding towards the

establishment of a diploma in public lighting which it was hoped would be recognized for the purposes of local government promotion and salary grading. The first examination would be held either in the autumn of 1953 or the spring of 1954.

Maintenance Methods

The first technical session took place on Tuesday afternoon, when Mr. C. C. Smith dealt with maintenance organization and methods as applied to public lighting systems. The paper was of a practical and administrative character and was based on experience gained from the operation and maintenance of the street lighting installation in Liverpool which consists of over 30,000 positions. After a general introduction in which he emphasized that maintenance was of such great importance as to warrant earnest and detailed consideration when an installation was only in the planning stage, he outlined the essential requisites of adequate maintenance.

There should be a nightly inspection of every lamp as near to scheduled lighting time as was possible, extra emphasis being placed on the necessity of patrolling danger bollards, etc., and main traffic routes where the accident potential was greatest. Regular cleaning was also important, as in a case quoted the light output was increased by 116 per cent merely by washing the lamp and glassware. However, cleaning operations should be restricted to the bare essentials only and should not involve the use of special chemical solutions or wire brushes.

The author felt that the group replacement of lamps was practicable in urban and rural districts, but in the city area where malicious damage was unfortunately common and where prompt attention was essential, lamps should be replaced as and when required.

Mr. Smith went on to discuss these and other points in some detail and explained how lamp maintenance requirements could be affected by careful thought and planning at all stages of a street lighting scheme. In conclusion, he suggested a system of organized operation and maintenance of a large installation together with some details as to the annual costs.

Traffic route lighting has achieved a high state of development in this country because of the fundamental research given to the subject, skilful lantern design and careful application by public lighting engineers. To provoke discussion and experiment from which further advances could be made, Mr. W. R. Stevens (G.E.C.) presented a paper on Wednesday morning stating four groups of problems concerned with lighting distribution, road surfaces and lighting of double carriageways and roundabouts.

First he discussed the relative merits of cut-off and non-cut-off lighting and said that the problem was how far should we depart from the high angle beam distributions which had served well for a long period, which permitted convenient flexibility in layout and were relatively cheap because of the long permissible spacing, in favour of closer spacing cut-off or medium angle distributions? Furthermore, how acceptable was the other alternative of fluorescent street lighting, bearing in mind its cost? In the case of lighting double carriageways he debated whether the orthodox system with staggered, non-cut-off distribution lanterns was best. Perhaps the same principle could be preserved with the improvements and economies offered by unidirectional lighting, or a cut-off system might give an even more valuable result.

After discussing the lighting of roundabouts and considering whether or not there was sufficient co-operation between highway and lighting engineers, Mr. Stevens concluded that the solutions to the problems which he had posed must come at least as much from public lighting engineers as from laboratory research.

Street Lighting in France

In the afternoon Monsieur L. Gaymard spoke on fluorescent street lighting in France. He said that the public authorities there had waited until detailed information was available concerning foreign fluorescent street lighting both from the financial and technical points of view. The Fine Arts authorities were hesitant owing to the shape and size of lanterns.

The first French installation was in the Avenue du President Wilson, Paris, in October, 1947. It comprised 12 lanterns on the central reservation on 30ft poles with an overhang of about 10ft, each lantern containing five 4ft 40 W tubes, with the auxiliary gear housed in the base of the pole. The spacing was about 100ft, the carriageway being about 27ft wide. Because of the success of this installation, the city of Paris has decided upon further

installations and fluorescent lighting is now installed in several towns.

There are three types of French fluorescent lanterns; a six 2ft tube lantern for residential areas, etc.; 4ft tube lanterns for two and three tubes which are suitable for both ordinary and tree-lined streets; and 5ft tube lanterns for two and four tubes which are intended for main thoroughfares, broad circuses, etc. They are mostly of aluminium alloy and the reflectors are of anodized pure aluminium. The protection is either by French " Plexiglas," " Perspex " or American " Lucite."

The best French tubes were now guaranteed for a year but there was a difference of about £25 in the cost of fluorescent and tungsten lanterns, including lamps and tubes. The maintenance of fluorescent fittings was also more expensive.

At the next conference session two films were shown, one depicting the need for good street lighting and the other dealing with the requirements under the Code of Practice for street lighting. These were introduced by Mr. C. W. M. Philips and Mr. H. E. G. Watts, who dealt with the questions after the films had been shown. Two more films are to be introduced at the final technical session to-day (Friday) by Mr. P. M. Davidson. They will deal with the manufacture of glass and its application to street lighting equipment.

Census of Production

IN the Census of Production for 1951, the forms for which will be sent to firms during the first week of January next, information will be collected about power equipment and fuel usage and about shift working. Details on these for the week ending 22nd September, 1951, or for the nearest ordinary week if this is not a normal one (week ending 27th October for sugar and glucose trade) will be required from all establishments employing more than ten persons on the average except those of textile converters, builders and contractors, and the building and civil engineering departments of local authorities, railway, tramway and canal undertakings. Special arrangements for coal mines, petroleum refineries and gas and electricity undertakings are being made in co-operation with the Ministry of Fuel and Power.

Firms are being asked to state the total installed capacity and reserve or idle capacity during the week specified of the various types of prime movers driving generators, expressed in terms of b.h.p. for reciprocating internal combustion engines and h.p. in all other cases; types of prime movers not driving generators; generators expressed in terms of their rated maximum continuous capacity in kW; and electric motors expressed in terms of maximum continuous b.h.p., distinguishing as far as possible between those driven by purchased electricity and those driven by electricity generated within the works, with separate particulars of the number and capacity of f.h.p. motors.

Questions will also be asked about the description, duration and number of shifts worked, the average number of operatives employed on each shift and the average number employed during the week other than on shift-working.

Copies of the relative sections of the form showing the precise details of the information to be collected on these subjects are available on application to the Census of Production Office, Neville House, Page Street, S.W.1.

Electrically Operated Platforms

SINCE June last the movement of passengers embarking at Holyhead for Dun Laoghaire has been facilitated by two electrically operated adjustable platforms at Holyhead. The platforms, adjustable over a height range of 6ft 9in, provide a level gangway at any state of the tide. Each has a timber deck measuring 10ft by 9ft 6in which projects 4ft beyond the face of the Customs building and twelve independent steps are provided to give access from the platform to the upper floor ; these, when in the lowest position, rest on padstones in the enclosing walls. As the platform is moved up they are picked up in succession by the moving underframe and are arranged to form a level surface continuous with the deck. The steps are held in position by guides.

The underframe of the platform consists of two 12in by 6in rolled steel beams 20ft 6in long braced together 4ft apart and supported at their ends on four bronze nuts which operate on vertical square thread screws. These screws are carried on thrust bearings at their upper ends to ensure that they are always in tension under the weight of the platform and each is supported between a pair of rolled steel channels which form the guides for maintaining the platform in position horizontally. The screws are rotated uniformly by means of an arrangement of bevel gears and shafts taking power through a single worm reduction unit coupled to a 5 h.p. electric motor, the whole of the operating gear, being situated on foundations below the lowest level of the platform. An electro-mechanical brake is fitted to ensure that the driving gear is brought to rest and holds the platform in any desired position level with a step. Over-run in either direction is prevented by limit switches, the mechanism being controlled from the upper deck of the Customs House by means of push-buttons.

Engineering in Europe

Survey of Current Literature

THERE is no doubt that the ignition systems of car engines are among the greatest radio troublemakers, especially where short-wave and T.V. reception are concerned. Many countries have already passed legislation making interference suppression compulsory. It is reassuring therefore to know that suppressor resistances, usually of the order of 20 kΩ, do not interfere with the operation of the ignition system (in fact, this remark applies to resistances up to 2 MΩ).

A theoretical analysis makes the effect of the damping resistance quite clear, namely, that the normal damped sine curve (containing a d.c. component) of the discharge voltage and current is shifted by the insertion of a suppressor resistor into the aperiodic and, finally, the exponential range. A beneficial effect of the suppressor resistor is the reduction of the electric charge liberated, since this reduces the consumption rate of the electrode points of the spark plug and lengthens the service life of the latter. The most favourable value of the suppressor resistance seems to be 10 kΩ (−20 per cent, +40 per cent). Retarded ignition would only occur at much higher resistance values.—" Influences of Suppressor Resistors in the Ignition Circuit on the Voltage and Current Fundamentals of the Ignition System," H. Mackh, *Elektrotechn. Zeitschrift*, Vol. 72, No. 12, pp. 375–377, 1951, in German.

Tungsten Contacts

In spite of its high residual resistance, tungsten has become an indispensable and, so far, irreplaceable contact material wherever opening and closing arcs in operation would cut short the service life of almost any other material. The most valuable characteristics of tungsten in this respect are its high melting point, great hardness and low sparking propensity. The tungsten blanks used for contacts are produced by sintering from WO powder of highest purity and subsequent hot working into rods, from which the contacts are cut off. The latter are then brazed or welded on to the contact bearers and finally ground, lapped or polished electrolytically. According to the special conditions of the technological process, three different types of structure of the finished contact may be obtained, viz., a coarse-grained one by recrystallization during sintering; elongated crystals by peening at high temperatures and a fibrous one by hot drawing. In the last configuration it is important to know whether the fibres lie in (or parallel to) the plane of contact, or stand normal on it, and what is the effect of the direction of the crystal fibre on the wear properties of the contact. Laboratory tests in a set-up simulating the operation of teleprinter contacts showed that the wear rate at the cathode is less when the fibre direction in a homogeneous, fine, fibrous structure is normal to the contact surface, and greater and more irregular when the fibre lies in the contact surface.—" Influence of the Direction of the Crystal Fibre on the Wear Resistance of Tungsten Contacts," A. Keil and C. L. Meyer, *E.T.Z.*, Vol. 72, No. 11, pp. 343–346, 1st June, 1951 (11 illustrations), in German.

Oil-pressure Cables

Oil-pressure cables were investigated by means of a combination of modified Schering bridge with a c.r.o. so that the oscillograms taken simultaneously with voltage characteristics at high temperatures revealed details of the processes in the insulation of the cables at increased temperatures and pressures. In this connection it is very important to measure on the rising as well as on the descending branch of the voltage curve.

The temperature rise results in the formation of oxidation products which increase the conductivity, especially in the presence of moisture. Apart from those formed in the paper itself, these electrolytic ions may be precipitated on the paper surface by the electric field at the beginning of an a.c. cycle, but may be liberated again on the ascending voltage branch. Thus these " electromorphic " ions increase the

conductivity from a certain value of the field strength onwards, the more so with greater moisture content. The deterioration of the insulation so caused is permanent and its extent depends on the voltage applied. The ionized oil particles will also adhere to the paper surface if the field is strong enough. The rising character of the voltage curve may be attributed to oscillations of oil particles, thermally or otherwise ionized, near the paper surface or between the paper fibres. Application of high pressure has no influence on this phenomenon.—" Tests on Oil-Pressure Cables," C. F. Proos, *Electro-Techniek*, Vol. 29, No. 14, pp. 263–275, 5th July, 1951, in Dutch.

Telephone Line Induction

The Montecatini Supply Co. made comprehensive tests on the effects of short circuits to earth in its 220 kV system on neighbouring telephone lines running parallel with the transmission line, and on appropriate means of protection against the dangers of the induced voltages. Theoretically, there are also dangers from induced electrostatic charges, but in practice they were found to be non-existent. The tests included checking the calculated line constants and s.c. currents of the transmission line, and the mutual induction coefficients between the two lines (calculated by the Carson-Pollaczeck method). Good agreement was found. Furthermore, the operation of the protecting devices, the maximum currents they could dissipate, and the time taken for this were observed. The mutual induction coefficient between the lines on a certain section was slightly lower than the calculated value (1·65 V/A inducing current, instead of 2 V/A) which may be due to different soil resistivities and to the screening effect of intervening water courses.

Of great importance for the induction phenomena is the harmonic content of the inducing h.v. currents in the neutral. A third harmonic of only 2 per cent was found. Although neither the induced voltages nor the discharge currents ever reached a dangerous level (considering the extremely short durations of single-phase earth faults), the protective measures which may be recommended are three-electrode gas-filled divertors or reinforced telephone divertors of the vacuum type suitably inserted at the ends of sections of the telephone line running parallel with the transmission line and, equally important, frequent transpositions of the telephone wires in the parallel sections (once every 300 m). Full details of all the tests with circuit diagrams and oscillograms are given in the article.—" Parallel Runs between Telephone and Overhead Power Lines," F. Catenacci, *L'Elettrotecnica*, Vol. 38, No. 3 bis, pp. 134–140, April, 1951, in Italian.

Cable Interference

This investigation was undertaken mainly in order to establish the disturbing effect of power mains on precision measurements in the laboratory. It was already known that, where cable lines are concerned, certain correction terms have to be used to allow for the screen effect of the cable sheath and the stranding of the conductors, and also that the screen effect of the sheath is different for the different symmetrical current components. For the zero-sequence components it is negligible, but not for the positive and negative sequence components.

The paper considers first the reduction of the magnetic field strength of a two-conductor cable by the stranding of the conductors. The calculation, though involving Hankel and T-functions, is more or less straightforward and the result derived for d.c. conditions easily extended to single-phase and three-phase currents. Again, the influence on the zero-sequence currents and therefore on their external effects is negligible, but that on the positive and negative sequence currents appreciable, in the sense of a field reduction. The results are given in graphs which permit one to assess the reduction factor of the flux density as a function of the ratio of the distance of the cable to the length of lay (pitch) of the cable. Neglect of this correction leads to gross over-estimations of the flux density, e.g., for the ratio 10, by a factor 10^{25}.—" Electromagnetic Influence of a Multiple-Conductor Line, with reference to the Stranding of the Conductors," K. M. Polivanov, A. V. Netushil and B. Ya. Zhukovitskii, *Elektrichestvo*, No. 7, pp. 28–33, July, 1951, in Russian.

Readers may arrange, by request, to obtain accurate full translations of any of the articles abstracted in this section, at the usual rates.—Editors, *Electrical Review*.

Commerce and Industry

Copper Prices Reduced

Australia's Plant Programme

THE Ministry of Materials announces that from 13th September the price of electrolytic copper has been reduced by £7 to £227 per long ton delivered to consumers' works. Discounts, premiums on special shapes and the limitations on forward purchasing arrangements announced by the Ministry of Supply on 1st May, 1951, remain unaltered. The Ministry of Materials' buying price for rough copper in slabs of from 2 to 3 cwt remains unchanged.

The Minister of Supply has made the Non-Ferrous Metals Prices (No. 7) Order, S.I. 1951 No. 1650, making corresponding adjustments in the controlled maximum prices of scrap and unwrought brass from 13th September. Maximum prices are reduced as follows:—All descriptions of copper scrap by £7; 80/20 cupro-nickel scrap, all descriptions of gunmetal scrap, and gilding metal scrap by £6; scrap QF & SAA cases, and brass cuttings, 70/30 cupro-nickel scrap, 65/35 and 70/30 casting quality brass ingots, etc., and 70/30 brass strip ingot for rolling, by £5; brass ingots, etc., to B.S.S. 218 or 249, 63/37 strip ingot for rolling, and brass rod and fuze scrap, brass swarf and heavy brass scrap, by £4.

Pedestrian Controlled Vehicles

The regulations granting exemption in certain cases from the requirement of the Road and Rail Traffic Act, 1933, that a goods vehicle shall not be used for the carriage of goods for hire or reward, or in connection with a trade or business, except under a carrier's licence have now been consolidated in the Road and Rail Traffic Act (Exemption) Regulations, 1951, which came into force on 1st September. At the same time the Minister of Transport has granted additional exemptions, including pedestrian controlled vehicles. Copies of the Regulations can be obtained from H.M. Stationery Office.

S.E.B. Convention

As part of its scheme for the education and training of members of its staff, the Southern Electricity Board held a Graduate and Engineers' Convention at its head office, Maidenhead, from 11th to 13th September. The Convention was opened by Mr. R. R. B. Brown, deputy chairman of the Board, and during the three days a number of talks were given on the various aspects of electricity supply development. Among those who were present were Mr. H. W. Taylor (chief engineer), Mr. J. W. Thomas (director, welfare, safety and training, B.E.A.), R. H. Abell (design and planning engineer), A. G. Beverstock (education officer), A. Beckingsale (regional safety officer), R. Lonsdale (Bracknell district manager), J. H. Blake (chairman, Graduates' Association), and K. J. Cornforth (secretary, Graduates' Association).

Gauge and Tool Makers' Association

The annual report of the Gauge and Tool Makers' Association, which will be submitted to the annual meeting on 9th October, shows that the membership is now 220 firms wholly or primarily engaged in the manufacture of such products as gauges and measuring instruments and equipment; jigs, fixtures and special tools; special-purpose machines; press tools; engineers' small tools; portable power tools; moulds and dies; and diamond tools. The report reviews the various activities of the Association during the past year.

Carnival Tableau

The Pirelli-General sports tableau shown in the accompanying illustration was entered in a

Pirelli-General sports tableau entered in a recent carnival procession

New " Ekco " lamp showcard

recent Festival of Britain carnival procession and obtained a special award. Among the trophies on view was the C.M.A. All-England Football Cup which Pirelli-General won for the season 1950–51.

Electrician's Pocket Book

A number of new sections have been embodied in the 566-page 1952 edition of the " Practical Electrician's Pocket Book," edited by R. C. Norris. They include chapters on the selection, installation and maintenance of private generating plant and industrial transformers, emergency lighting systems, sound-distribution cables, portable electric tools, the use of ring main wiring, etc. The pocket book is published at 5s by Odhams Press, Ltd., 6, Catherine Street, London, W.C.2.

Lamp Sales Aid

A new range of showcards for retailers of " Ekco " lamps and lighting equipment has been made available by Ekco-Ensign Electric, Ltd., for the winter season. Among them is the 14in high three-dimensional cut-out in full colour (illustrated) which shows four typical examples of the " Ekco " tungsten range and a " Double Life " fluorescent lamp. The showcard is constructed from heavy board and is efficiently strutted to stand foursquare in a window or on a counter.

" The Flying Dutchmen "

A flying visit in more senses than one was made last week to the works of Parnall (Yate), Ltd., by fifty-six retailers in the Netherlands of Thor washing machines. The trip was jointly arranged by Thor Appliances, Ltd., Parnall (Yate), who manufacture in this country Thor " Automagic " combined clothes and dish washers and " Stowaway " washing machines, and Hart, Nibbrigg & Greeve N. V., the agents for Thor in the Netherlands. The party flew from Holland to Weston-super-Mare in two Dakotas. Luncheon was taken at the Grand Hotel, Bristol, and was followed by a tour of the Yate Works, before returning to Holland the same evening.

The luncheon was quite informal and the only speeches were an address of welcome by Mr. J. W. Barton, managing director of Thor Appliances, and a response by Mr. J. A. Pool, representing Hart, Nibbrigg & Greeve, N. V. Those present included Mr. W. Angus, director and export manager of Thor Appliances, Mr. S. L. Pleasance, Parnall (Yate), Ltd., and Mr.

Picture taken at Weston-super-Mare airport during the visit to the Parnall (Yate) factory of retailers of Thor products in the Netherlands. Seated, front row, commencing with fourth from the left: Messrs. F. Pollaczek, J. W. Barton, J. A. Pool, W. Angus, S. L. Pleasance and E. T. Trotman

F. Pollaczek, export sales manager of the Thor Corporation of Chicago.

After luncheon, the guests were taken by coach to the works where they were divided into small parties under experienced guides. Despite the short time available they were able to witness the complete process of manufacture of the washing machines from the raw materials to the despatch of the finished machines which are being exported to seventy-nine countries overseas, and the information gained will assist them in promoting the sales of these machines in the Netherlands. The departments visited in turn were the machine shop, the press and fabrication shop, the enamelling section, the polishing and plating shop, the assembly department for washing machines and electric cookers and the despatch department.

Cotton Mill Conversion

Rochdale Trades and Labour Council last week rejected a motion, submitted by the Power Group of the Rochdale Branch of the Transport and General Workers' Union, calling on the British Electricity Authority to stop the conversion of cotton mills to electric drive until the supply of electricity could meet the demand. One speaker pointed out that the B.E.A. was a public body and if a request for its services was made, it must do its best to perform that service.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £124 0s 0d
COPPER, H.C. Electro	ton £227 0s 0d
Fire Refined 99·7 per cent ..	ton £226 0s 0d
Fire Refined 99·2 per cent ..	ton £225 10s 0d
COPPER Tubes	lb 2s 2d
Sheet	ton £277 10s 0d
H.C. wire and strip	ton £254 0s 0d
LEAD, English	ton £181 10s 0d
Foreign	ton £180 0s 0d
MERCURY	flask £73 10s 0d
TIN	ton £920 0s 0d
ZINC, G.O.B. Foreign	ton £190 0s 0d
Electrolytic	ton £194 0s 0d
BRASS Tubes	lb 2s 1d
Sheet	lb 2s 4½d
Wire	lb 2s 7¼d
PHOSPHOR BRONZE	
Wire	lb 3s 6¾d
RUBBER, No. 1 R.S.S. spot ..	lb 17¾–18¼d

Convalescent Home

Representatives from all the factories of British Insulated Callender's Cables, Ltd., were present at Lytham (Lancs.) recently, when a new extension to the employees' "Home of Rest" was officially opened by Alderman R. J. Hall, J.P., a director of the company.

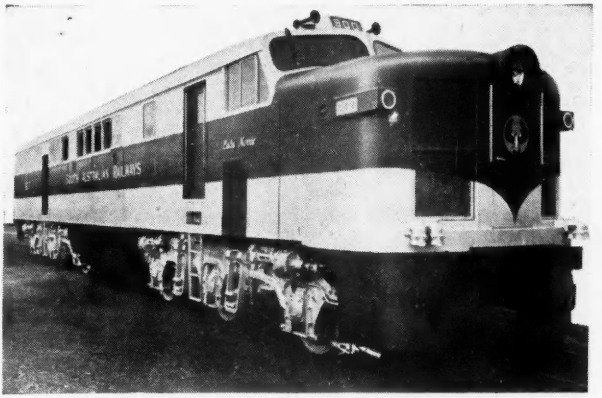
The scheme, which provides a means of rest and recuperation for company's employees

Alderman R. J. Hall, a director of B.I. Callender's Cables, Ltd., opening the new extension to the employee's "Home of Rest"

suffering ill-health, was launched some twenty-three years ago when the first "Home of Rest" was opened at Whitford (North Wales). Just before the last war, however, these premises were closed and the Lytham Home purchased. The growth of the scheme, particularly since the war, necessitated larger premises and an adjoining house was purchased. This has now been furnished and equipped, and structural alterations have made the whole premises one unit with accommodation for forty-four guests. To mark the opening of the new extension the directors of the company presented a radio-gramophone which has been installed in the main lounge of the Home.

Electrical Commercial Travellers

An entertaining evening was spent on Friday last at the Feathers Hotel, Broadway, Westminster, London, S.W.1, when the Electrical Trades Commercial Travellers' Association held a Questions Forum. Mr. H. A. Deacon, the president of the Association, was the question master, and he had gathered around him an experienced team consisting of Mr. C. Brooks (editor of *Truth*), Mr. K. Lewis (member of the Middlesex County Council), Cmdr. E. G. Marshall, R.N.V.R. (who is now in the legal profession), and Mr. M. Romain (an economist). The questions had been submitted by members of the Association and they related, among other subjects, to such matters as the value to the country of the Festival of Britain, whether females made good secretaries, and the reasons for the increase in sexual crimes. The team tackled these problems with an expertness and



The *Lady Norrie*, a 1,760 h.p. diesel-electric locomotive with English Electric equipment, which has started regular service in Australia

wit which were greatly appreciated by the audience. The meeting attracted a large attendance, and in view of its success organizers have decided to repeat the experiment at a future date.

Members are reminded of the Festival Year ladies' night, which is being held at the Café Royal on 5th October, and the annual dinner-smoking concert which will be held at the Windsor Castle, Victoria, S.W.1, on 6th December.

Educational

The 1951–52 session of the College of Technology, Birmingham, commences on 24th September. The prospectus of the courses available in the Department of Electrical Engineering which cover, in addition to the normal telecommunications and electrical engineering work, post-graduate lectures, is obtainable from the Department, 53, Broad Street, Birmingham, 1.

Diesel-Electric Locomotives in Australia

The *Lady Norrie*, the first of ten 1,760 h.p. main line diesel-electric locomotives for the South Australian Government Railways, went into regular service on 10th September. It is the first main line diesel electric locomotive to operate regular schedules on the mainland of Australia. The motive power equipment, including the diesel engine, generator, traction motors and control gear for this locomotive, and for the remaining locomotives under construction, was supplied by the English Electric Co., Ltd. The locomotives, which are being built in the workshops of the South Australian Government Railways, will be used in pairs to haul the "Overland Limited Express" and 600-ton freight trains over the Mount Lofty Ranges, where the ruling grade is 1 in 40. Their use will enable accelerated schedules to be introduced, so increasing the traffic capacity of the line over the Mount Lofty Ranges, and postponing the need for doubling the track over this section. These double bogie locomotives have the A1A-A1A wheel arrangement, the outer axles being motored in each three-axle bogie, and are equipped with rheostatic braking. Each locomotive has a maximum starting tractive effort of 60,000 lb, a continuous tractive effort of 34,000 lb at 15 m.p.h. and a maximum service speed of 70 m.p.h. Twelve English Electric diesel-electric locomotives of 660 h.p., built jointly with Vulcan Foundry, Ltd., are already running on the main lines of Tasmania. Altogether 32 of these are on order.

Warning Against Toy Iron

The Royal Society for the Prevention of Accidents has drawn the attention of the Home Office and the Board of Trade to a toy electric iron presenting dangerous features which has been found to be on sale in this country. The toy has no heating element, but is provided with a length of imitation flex and a two-pin plug made of metal which will fit electric wall sockets in use in the United Kingdom. If a child probed a live wall socket with it, the consequences might be an electric shock, probably fatal. All concerned in the distribution and manufacture of toys of this kind are asked to see that toys which are constructed in a manner likely to be dangerous if used by children are not offered for sale.

E.P.E.A. South Eastern Division

The annual dinner of the South Eastern Division of the Electrical Power Engineers' Association to members of the National Executive Council has become one of the Association's principal events. The 1951 dinner —the twenty-fourth of the series—will be held at the Connaught Rooms, Holborn, on Friday, 23rd November, at 5.30 p.m. for 6 p.m. Arrangements will be similar to those of former years, with dancing to Tommy de Rosa's Band following the dinner. Tickets will be £1 5s. each to members (each member being limited to a ticket for himself and lady) and £1 17s 6d to

non-members. Any further information can be obtained from Mr. F. H. Smethurst, divisional hon. secretary, 118, New Kent Road, London, S.E.1 (telephone: Rodney 3085).

British Electrical Plant for N.S.W.

The Sydney correspondent of the *Times* reports that Mr. H. G. Conde, chairman of the New South Wales Electricity Commission, who has returned after a plant-buying mission in Britain, Germany, France, Italy, and the United States, said he had arranged for Mr. J. N. Waite, controller, London Division, British Electricity Authority, to advise the New South Wales Government on the operation of power stations to be taken over from the Sydney County Council and other authorities.

The United States, he said, had granted the highest defence priority for 190,000 kW of generating plant for Australia, of which 140,000 kW would be for New South Wales. In addition, New South Wales would get 700,000 kW of plant from the United Kingdom; this would be mostly steam generators for new power stations. He believed the United States was the best place to get plant from expeditiously. They might have more difficulty in getting it from the United Kingdom because of the shortage of steel and shipping space. He was impressed by offers made in Germany and Italy to provide plant as well as structural steel and man-power to install it. There was a possibility of getting generating equipment from Japan.

Trade Announcements

A new branch has been opened this week by the **Sun Electrical Co., Ltd.**, at 261, Water Road, Abbeydale Road, Wembley, Middx (telephone: Perivale 0561). The new branch is under the management of Mr. J. H. Wright, formerly manager of the company's Appliances and Heating Department at Charing Cross Road, W.C.2.

Thorn Electrical Industries, Ltd., announce that the offices of their Lighting Division have been removed to 233, Shaftesbury Avenue, London, W.C.2 (Temple Bar 1599). Later in the year a showroom will be opened there.

Wilkins & Mitchell, Ltd., manufacturers of "Servis" electric washers, announce the formation of Wilkins & Mitchell (Ireland), Ltd., with head office at 91b, Rathgar Road, Dublin. The company will control sales for Northern Ireland as well as the Irish Republic, and will undertake the maintenance and servicing of all types of washers besides "Servis." Service depots exist in Dublin, Cork and Belfast. The commercial manager in Dublin is Mr. G. J. Osborne.

The new telephone number of the Boscawen Bridge, Truro, depot of the **Sloan Electrical Co., Ltd.**, is Truro 3661.

Zagreb International Fair

In the British Pavilion at the Zagreb International Fair being held from 15th to 30th September, the Metropolitan-Vickers Electrical Co., Ltd., is showing examples of its range of standard industrial motors, control gear and electromagnetic brakes, together with relays, and a range of industrial lighting fittings for metal-filament and fluorescent lamps.

Catalogues and Lists

S.L.R. Electric, Ltd., South Harrow Viaduct, South Harrow, Middlesex.—Illustrated leaflets and price list on lighting fittings.

Alar, Ltd., 3, Albemarle Street, London, W.1.—Technical data sheet giving guidance in the selection of aluminium casting alloys.

Vario-Strateline Gears, Ltd., 278, Aberdeen Avenue, Trading Estate, Slough, Bucks.—Folder on variable speed gearboxes and speed reducers.

Westinghouse Brake & Signal Co., Ltd., 82, York Way, King's Cross, London, N.1.—Two technical brochures on railway signalling equipment, one describing a message repeater and the other dealing with automatic announcing apparatus.

Metropolitan-Vickers Electrical Co., Ltd., St. Paul's Corner, 1-3, St. Paul's Churchyard, London, E.C.4.—Priced catalogue covering the company's entire range of lamps and light sources.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Two priced catalogues of "Osram" lamps, one dealing with projector lamps and the other with lamps generally.

Sharples Centrifuges, Ltd., Woodchester, Stroud, Gloucestershire.—Bulletin 551, describing a wide range of super-centrifuges.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Ceilite" pendants, lamps and wrought iron fittings.

"Comer" power plant.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Aircraft Electrical Equipment

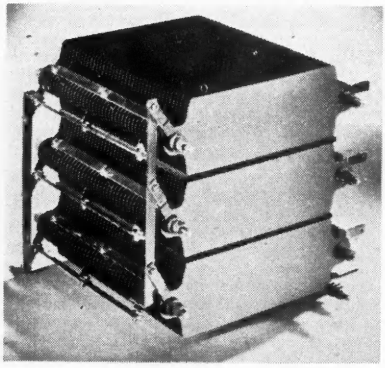
Display at Farnborough

THE annual flying display and exhibition of aeronautical equipment and instruments organized by the Society of British Aircraft Constructors (S.B.A.C.) was held at the Royal Aircraft Establishment at Farnborough, Hants, from 11th to 16th September. This year's show was undoubtedly far more comprehensive than ever before and the exhibition of equipment included a large number of items of electrical interest.

Among the most important devices in modern aircraft are the instruments, a representative selection of which was displayed by Sangamo Weston, Ltd., including those for use with navigational systems, power indication and temperature and movement measurement. Apart from ground test sets other exhibits included relays, thermocouples, thermometer bulbs, oil pressure transmitters and position indicators.

The range of apparatus shown by Smiths Aircraft Instruments, Ltd., included an electric auto-pilot, inductor pressure gauges, engine speed indicators, small electric motors, electric and air-driven artificial horizons, directional gyros, airspeed indicators and turn and slip indicators. Among a similar collection of devices Bryans Aeroquipment, Ltd., had a bench testing unit for calibrating and checking all types of tachometer instruments.

Standard Telephones aircraft rectifier



Galley and lighting equipment for the de Havilland "Comet" jet airliners ordered by B.O.A.C. was prominent on the G.E.C. stand. Three of these items, a 3 kW air circulation oven, a 2 gall urn and a miniature table lamp have been specially designed for the "Comet." The company also had a new 2·25 kW airport location beacon designed to conform with the latest requirements of the International Civil Air Organization (I.C.A.O.), and an elevated high intensity runway light for a 100 W lamp. Other exhibits included a display of Pirelli-General aircraft cables and G.E.C. heavy alloy as used for aileron and rudder balance weights, etc.

Cables for use in aircraft were shown by British Insulated Callender's Cables, Ltd. There were connecting wires, sleevings, multi-way cables, a new polytetrafluoroethylene-insulated, high-energy ignition cable for jet engines and "Uniplughitemp" ignition cables which have been developed to withstand the high temperatures encountered in piston-type aero engines.

The British Thomson-Houston Co., Ltd., had a variety of electrical equipment on its stand which included impulse-turbine starters for gas turbines, high-energy igniter units, booster coils, a.c. and d.c. motors and generators, actuators, switches, circuit-breakers, motor generator sets with electronic voltage regulators, and magnetos and distributors. There was also an electronic instrument for testing multi-cylinder engines. It provides a simple and accurate means of identifying and locating faults and has the advantage that it demonstrates the deterioration of components before any indication is detectable from engine performance.

Ferranti, Ltd., showed on their stand the ground beacon and aerial systems of the company's 1,000 Mc/s distance measuring equipment which has been designed to the I.C.A.O. specification for remote control, unattended operation and ease of maintenance. Also on view were the Mark

1. B.T.H. electronic ignition tester. 2. Plessey dual diversity receiving terminal. 3. G.E.C. 2.25 kW airport location beacon. 4. Sangamo Weston engine oil temperature indicator. 5. Bryans Aeroquipment bench test unit for tachometer instruments. 6. Ferranti distance measuring equipment, ground beacon

IVE gyro gunsight fighter installation and the Ferranti pilot's crossed pointer indicator.

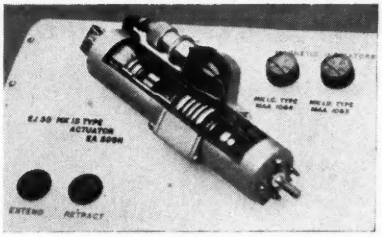
The theme of the Marconi's Wireless Telegraph Co. stand was suppressed aerials for aircraft, which have solved the problem of reducing aerial " drag " on modern high-speed aircraft. Essentially these aerials are built as integral parts of the aircraft fuselage and such installations are now planned on the initial drawings in close co-operation with aircraft designers. An automatic direction finder, v.h.f. multi-channel equipment and a pre-tuned h.f. receiver providing immediate selection of any one of 30 spot frequencies were also exhibited.

The exhibits of the Plessey Co., Ltd., comprised a wide range of electrical actuators, turbine and cartridge starters, f.h.p. motors, and a selection of aircraft wiring accessories, pre-formed wiring and plugs and sockets of the latest type. An associated company, Plessey International, Ltd., had a constant level amplifier, an aerial multi-coupler and a dual diversity receiving terminal which provides for crystal controlled space or frequency diversity radio/telephony reception in the h.f. band 2 to 20 Mc/s.

Apart from radio transmitting and receiving apparatus, instrument landing system receivers and a frequency modulated radio altimeter, Standard Telephones & Cables, Ltd., had a display of " SenTer-Cel " selenium metal rectifiers for aeronautical applications which included typical rectifier stacks constructed with aluminium plates. These are available to duplicate the output of any standard spindle mounted unit and the weight reduction when compared with steel components is about one third. A typical unit has an output of 112 V at 300 A when forced air cooled and yet it weighs only 28 lb.

Lightweight " Westalite " rectifier units were shown by the Westinghouse Brake & Signal Co., Ltd., in several applications to aircraft electrical systems. It was demonstrated that these selenium-compound units, with forced air cooling, have a weight/capacity ratio of under 3 lb/kW.

Simplified v.h.f. radio equipment both for airfields and for charter and private aircraft were among the exhibits of E. K. Cole, Ltd., together with airborne "Search radar " now being made for B.O.A.C. This equipment not only gives warning of dangerous cloud conditions and high ground, but also provides map-painting facilities.



Western Manufacturing Estate actuator cut away to show working parts

Apart from exhibiting and demonstrating its aircraft the English Electric Co., Ltd., had a representative range of aircraft electrical equipment on view, including a.c. and d.c. lightweight motors, gearboxes and generators for Service and civil aircraft, and a comprehensive range of actuators. A very complete range of electrically operated actuators was also shown by Western Manufacturing Estate, Ltd.

Venner Accumulators, Ltd., had examples of its lightweight silver-zinc alkaline accumulators on view while, apart from time switches, Venner Time Switches, Ltd., stowed navigational flashing units, emergency lighting panels, fire delay switches and jets tarter switches.

A range of specialized hot air valves and other units for use in cabin conditioning systems was shown by Teddington Controls, Ltd., together with time switches for all kinds of aircraft services, and temperature and pressure controls.

Comprehensive ranges of aircraft batteries of all types were shown by Chloride Batteries, Ltd., Oldham & Son, Ltd., and Peto & Radford, Ltd.

Radio Show for the North

NORTH country interest in the Radio Show, which closed at Earls Court, London, on 8th September, has led to a decision by the organizers, the Radio Industry Council, to hold a radio and television show in the City Hall, Manchester, in the spring. Provisional dates are 23rd April to 3rd May, 1952. Mr. F. W. Perks, chairman of the Exhibition Organizing Committee of the Council, said that they were very satisfied with the attendance—232,752—in their first year at Earls Court and intended to hold the Show there again in September, 1952.

Radio without Valves

Crystal Valve Receiver Operates Loudspeaker

AS an illustration of the capabilities and possible future applications of the germanium triode, the G.E.C. has built a simple experimental radio receiver which affords acceptable loudspeaker output by using germanium triodes instead of the usual thermionic valves.

Germanium triodes are descendants of the crystal detectors used in the early days of radio and have the same essential feature of a metallic crystal with which contact is made by means of points. The early crystal detectors were very unstable and erratic and have been completely superseded by the development of germanium crystal diodes, which the G.E.C. produces for television receivers, modern crystal receivers and other applications.

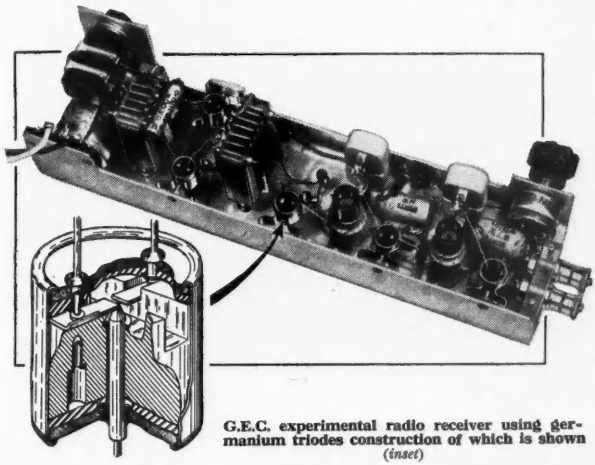
Experimental work in connection with these diodes has led to the development of the germanium triode and it is now possible to design a radio receiver which is stable, capable of withstanding severe mechanical shock and at the same time able to produce loudspeaker output with a low power consumption.

Points which must be borne in mind are that the present receiver is only experimental and industrial production of such a set is unlikely for some time. Although no filament heating power is required for the set it is not independent of electrical input and still needs a battery or an equivalent mains unit, which may incorporate germanium diodes as rectifiers. Furthermore, the crystal triode is not at present likely to replace the existing thermionic valves of an ordinary radio receiver. Nevertheless it is an important development in the field of electronics and it seems likely that the first applications will include electronic computing machines and lightweight radio sets.

To the question " What is the advantage of a crystal triode if the h.t. battery is still necessary? " the answer is that there is no filament or cathode to be heated and the unit is extremely robust, compact and long-lived. Filament or cathode heating may not seem important but in some receivers, for instance portables, the necessary equipment for it can add appreciably to the weight of the set. In apparatus where thousands of valves are employed, such as computing machines, the amount of power required for filament heating and the corresponding amount of useless heat developed may be substantial.

A battery is necessary in an " all-crystal " receiver because if power, in the form of a large volume of sound, is to be obtained from the loudspeaker, at least an equal amount of power must be supplied to the apparatus. In practice, more must always be supplied on account of internal losses, but as there is no filament to heat this wastage is relatively small.

The experimental receiver is of comparatively simple design and uses a two-circuit tuner to obtain reasonable



G.E.C. experimental radio receiver using germanium triodes construction of which is shown (*inset*)

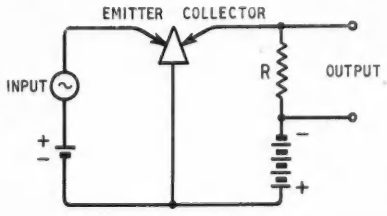
selectivity and five G.E.C. germanium triodes in the r.f. amplifying, detector and push-pull a.f. output stages. This results in a receiver of sensitivity, suitable for local station reception, which has an audio output of about 50 mW. A more sensitive and selective receiver can, of course, be made by using more germanium triodes, for example in a superheterodyne circuit, where a germanium triode oscillator would be employed.

The total power consumption of the present receiver is about 10 mA at 50 V, from which it will be seen that about 10 per cent of the total power input is utilized as loudspeaker output.

The design of the germanium triode is such that it can be made relatively easily. It consists of two phosphor-bronze blades 0·003in thick and 0·04in wide, supported in a moulded insulator. The gap between the blades is very critical and is obtained by means of a manufacturing technique which involves mounting a single strip across a channel in the moulding and subsequently shearing a gap a few thousandths of an inch wide with a specially designed cutter. The germanium is soldered to the tip of a metal stub and is ground to a point, with an angle of 60 deg. Then by inserting the apex of the resulting cone into the gap between the blades, the essential two-point contact is made with the germanium and with a spacing which can be very accurately controlled. The three electrodes are then the two blades and the stub.

In simple terms, the electrical operation of the triode depends on the fact that if a negative potential is applied to one of the blades (called the "collector") then the current to it can be varied by altering the positive voltage applied to the other blade (called the "emitter"). The "emitter" draws appreciable current when positive voltages are applied to it, in contrast to the thermionic valve in which grid voltage is the important factor controlling the anode current. In the germanium triode the "emitter" current controls the "collector" current, i.e., it is a current-operated device rather than a voltage-operated one.

Basic circuit of germanium triode amplifier



The characteristics of the germanium triode result in its having a low input impedance (about 500 ohms) and a relatively high output impedance (about 30,000 ohms) and the associated circuits have to be designed with this fact in mind.

For an amplifier, a typical operating condition would be:—collector: 1·5 mA at − 30 V; emitter: 0·5 mA at + 0·25 V, and with proper impedance matching such an amplifier stage will give a power gain of 20–30 db.

Because of the limited safe collector current, the output of a single germanium triode of the present design is about 20 mW, for a tolerable degree of distortion. Oscillators, however, may be made with outputs up to about 100 mW. There is an inherent upper frequency limit for operating the germanium triode, which arises from transit time effects in the germanium. At present this limit is about 10 Mc/s.

Public Speaking Competition

DETAILS of the Electrical Development Association's 1952 Public Speaking Competition are now available. The subjects set for the competitors' choice are "Was the Festival of Britain Justified?", "What I mean by 'Freedom of Choice'", and "Should Housing Estates be 'All-Electric'?" Entrants can speak on any one of these subjects for fifteen minutes. Members of the staffs of Electricity Boards, the North of Scotland Hydro-Electric Board and E.D.A. members in Northern Ireland, who have not reached their thirty-fifth birthday on 31st March, 1952, are eligible. The competition is held in two sections, one for men and the other for women. In each section two prizes, of £5 and £3 respectively, are awarded in the area competitions and certificates are also given. First prize-winners will represent their areas in the national finals. The award for the winners of the finals is a year's custody of the Faraday silver challenge shields, and silver plaques suitably inscribed which become their personal property. Certificates are also awarded to the first three place-winners. A booklet containing the rules can be obtained from E.D.A., 2, Savoy Hill, London, W.C.2. Intending competitors can also receive, free of charge, from E.D.A., a 36-page booklet entitled "Hints on Public Speaking." Entries close on 10th December.

ELECTRICITY SUPPLY

Standard Domestic Tariff

Glasgow Street Lighting Conversion

AT the meeting of the Merseyside and North Wales Electricity Consultative Council at Chester on 12th September Mr. W. Gilchrist (chief commercial officer of the Merseyside and North Wales Electricity Board) made a statement in connection with the Board's proposed introduction of a new standard tariff for domestic purposes. The Council, after discussion, gave its approval to the new tariff, which will come into operation from the first meter readings on or after 29th October.

The new tariff takes the place of 147 varying prices and methods of charge and 50 calibrations of prepayment meters. It is of the block-rate type, with a primary charge of 4½d/kWh (prepayment meter supplies 5d) and a lower secondary charge, at present 0·85d/kWh. The number of kWh charged at the higher price is to be calculated at the rate of 12 kWh per assessable room up to ten rooms (minimum two rooms) and 8 kWh for any additional rooms. The following accommodation is not counted : Entrance halls, vestibules, passages, larders, sculleries (if not used as kitchen), pantries, cloakrooms, closets, lavatories, bathrooms, attics without permanent staircase, boxrooms without external windows, cellars or basements not used as living rooms, central heating chambers, wash houses, coal stores, garages and tool sheds.

Some 611,000 postcards were sent out to domestic consumers to ascertain the number of rooms and 90 per cent have been returned. The method of charge and allocation of higher-priced kWh have been fixed so as to ensure that the cost of electricity is apportioned as equitably as possible and that the total money received under the tariff is not greater than under existing tariffs. It has not been possible to devise a system which would have the same effect on all consumers who are paying a fixed charge based on a percentage of the rateable value, for existing fixed charges vary greatly ; e.g., for a four-roomed house from as low as 3s 9d a quarter to 22s 6d a quarter. Many flat rate consumers will benefit by now paying for a proportion of the consumption at the lower rate of 0·85d/kWh.

Supply to "R.L.S." Village

The village of Swanston, which lies within the boundaries of the city of Edinburgh, has been connected with the Lothians main electricity supply. One of the first houses to switch on was Swanston Cottage, the summer home of Robert Louis Stevenson from 1867 to 1880. Swanston, mainly a farming community, had neither main gas nor electricity, though only half a mile from a cable in Oxgangs Road, and in May, 1949, petitioned the South East Scotland Electricity Board for its installation. The Board agreed, but for various reasons the work was delayed from time to time.

Generation in August

At B.E.A. power stations the following additional plant was installed during August :— Braehead : 50 MW Parsons set. Westwood : 300,000 lb/hr B. & W. boiler. Croydon : 52·5 MW "Metrovick" set. Including the North of Scotland, the installed capacity at the end of the month was 15,461 MW, a net increase of 97 MW compared with the July figure.

	Fuel consumed Thousand tons		kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water power	Total*		
British Electricity Authority ..	2,319	3·6	3,928	30	3,965	3,727	14,874
North of Scotland	14	1·0	22	78	103	102	587
Total for August, 1951	2,363	4·6	3,950	108	4,068	3,829	15,461
Corresponding total for August, 1950	2,131	4·1	3,609	117	3,738	3,523	14,467
Increase or decrease, per cent ..	+10·9	+12·2	+9·4	−7·7	+8·8	+8·7	+6·9
Total for year to date (eight months)	22,337	59·5	37,894	903	38,916	36,721	
Total for corresponding eight months of 1950	19,938	42·2	33,666	850	34,622	32,667	
Increase, per cent	+12·0	+41·0	+12·6	+6·2	+12·4	+12·4	

* The total figure includes 6·5 million kWh generated by oil engines and 3·7 million kWh by waste heat plants in August.

The rate of increase in electricity generated by the B.E.A., the North of Scotland Hydro-Electric Board and the Lochaber Power Co. in August—8·8 per cent—was below the average for the year which, as shown in the accompanying table, is now 12·4 per cent.

Avoiding Power Shortage

Six proposals for dealing with the electricity shortage have been approved by the Teeside Chamber of Commerce and are being forwarded to the Board of Trade, Chancellor of the Exchequer, various Electricity Boards, etc. The proposals are that responsible Government Ministers should understand that industry cannot carry out its functions without sufficient electricity supplies; there should be an increase in the supply of solid fuel for domestic space heating; a system of prompt warnings of electricity cuts should be introduced; firms should be given every encouragement to install their own generating plant; all sections of the community should be asked to co-operate in voluntary load shedding; and load spreading plans should ensure that electricity supply interruptions are reduced to a minimum. The Chamber's vice-president (Mr. J. C. H. Booth) said there had been plenty of talking on the subject but action was needed.

Rural Electrification Slowed Up

Wainford Rural District Council, which recently wrote to the Eastern Electricity Board on the question of rural supplies, has now been informed that the situation has recently deteriorated. The manager of the Suffolk Sub-Area said it was now clear that the capital available for rural development would be more restricted than they had anticipated, resulting in the deferment of much of the work that they had hoped to carry out in the near future.

Radio Warning of Power Cuts

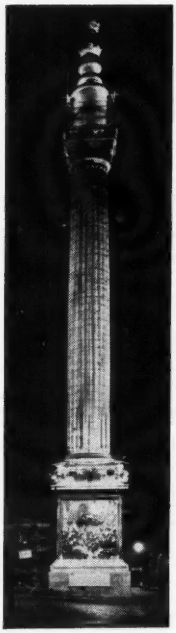
Tests of short-wave transmitter equipment to be used to give Glasgow and West of Scotland firms warning of power cuts this winter are due to begin this week.

Alternative 275 kV Line Route

Northumberland landowners who are opposing the proposed route of a 275 kV line from Carlisle to Blaydon-on-Tyne have approved an alternative route suggested by the Council for the Preservation of Rural England. The Ministry of Fuel and Power has announced that an inquiry into the plan will be held.

The Monument Floodlit

As part of the Corporation of London's Festival of Britain celebrations, the Monument in Pudding Lane has been floodlit, using fittings manufactured by Philips Electrical, Ltd. An interesting feature is that all fittings are mounted on the Monument itself. Four Philips "Winchester" projectors with 500 W G.L.S. lamps project upwards from the gallery and four similar fittings with 1,000 W projector lamps light the fluted Doric column. The carving on the west face of the plinth is lit in contrast by two Philips "Redhill" fittings with 140 W sodium lamps. The electrical installation was carried out by H. J. Cash & Co., Ltd., under the direction of Mr. G. Holliday, city surveyor, Corporation of London.



A famous landmark, the Monument, floodlit for the Corporation of London's Festival of Britain celebrations

Glasgow Lighting Conversion

Glasgow Corporation Police, etc., Committee has approved a scheme estimated to cost £240,000 for the change over of all street lamps in the city from gas to electricity, the expenditure to be spread over a period of ten years.

Off-Peak Tariffs

Douglas (I.O.M.) Corporation Electricity Committee has approved a recommendation of the borough electrical engineer (Mr. C. Anderson) that in order to encourage the use of electricity during the night a cheap rate of ½d/kWh should be introduced for water heating between 11 p.m. and 8 a.m. The Committee has also approved the introduction of a reduced charge of 3d/kWh for shop window lighting after 6 p.m. during the period October to March.

"All-Electric" Houses

The Onchan Village Commissioners (I.O.M.) recently considered whether gas or electricity supplies, or both, should be provided at one of their housing estates. It was agreed that electricity only should be available and that tenants should hire their own cookers. The chairman said that this would mean a saving of about £2 10s on the cost of each house.

School Lighting

Sunderland Town Council has received sanction to borrow £8,859 for installing electric lighting in place of gas in six schools.

Southern Rhodesian Imports

Greater South African Participation

ELECTRICAL imports into Southern Rhodesia last year declined as a whole, the fall being most marked in machinery and cable. It may be recalled that between 1948 and 1949 these branches of trade made a big advance. Exceptions to the reduction in 1950 were telegraph and telephone material and instruments. A remarkable feature in most lines (other than heavy machinery) was the progress made by South Africa in the electrical trade. The accompanying table shows the chief items of electrical equipment imported last year.

The favourable outlook for the hydro-electric developments on the Zambesi River at the Kariba Gorge promises well for future electrical imports. The largest demand for power is expected to come from the Salisbury–Midlands area, where conditions stimulate the establishment of all types of industry, considerable urban populations and economic rural distribution of electricity.

The official report on the Zambesi developments was summarized in the *Electrical Review* of 13th July (p. 70).

Class of Goods	1950 £(000)	Inc. or dec. on 1949 £(000)
Elec. cable and wire	699	— 229
From United Kingdom	302	— 337
,, *South Africa*	381	+ 126
Lamp bulbs	80	+ 9
From United Kingdom	44	+ 10
,, *South Africa*	26	+ 8
,, *Holland*	5	— 7
Telegraph and telephone material and instruments	713	+ 319
From United Kingdom	707	+ 322
Radio material and instruments	241	+ 23
From United Kingdom	186	+ 71
,, *South Africa*	53	— 17
Elec. stoves, ranges and parts	97	— 24
From United Kingdom	70	— 31
,, *United States*	22	+ 10
Other heating and cooking app.	186	— 12
From United Kingdom	143	— 23
,, *South Africa*	34	+ 6
Other elec. goods and apparatus	457	— 97
From United Kingdom	342	— 62
,, *Canada*	12	+ 10
,, *South Africa*	85	— 33
,, *United States*	13	— 7
Batteries	163	+ 15
From United Kingdom	76	+ 13
,, *South Africa*	81	+ 12
Motors and parts	174	— 29
From United Kingdom	158	— 23
,, *South Africa*	10	+ 4
Transformers	175	— 234
From United Kingdom	160	— 228
,, *South Africa*	14	—
Other elec. machinery	467	— 69
From United Kingdom	419	— 63
,, *South Africa*	18	— 12
,, *United States*	21	— 3

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to the dates stated:—

5th October

PHILIPS. No. 669,329. Class 7. Electric welding machines and parts thereof and fittings therefor, all included in Class 7; filters (being parts of engines, of motors, or of machines) for lubricants and industrial coolants; and electric generators for the induction heating of metals.—Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

FLUORACEC. No. 697,593. Class 9. Electric current stabilizers, transformers and electric starting devices all for fluorescent lighting apparatus. FLUORACEC. No. 695,842. Class 11. Fluorescent lamps and fluorescent tubes, all for lighting purposes, and parts thereof and fittings therefor, all included in Class 11.—Ateliers de Constructions Electriques de Charleroi, Brussels, Belgium. Address for service, c/o Feeny & Feeny, 2a, Charlwood Place, Westminster, London, S.W.1.

No. 698,628 (design). Class 9. Wireless and television instruments and apparatus, and parts of all such goods included in Class 9.—Bush Radio, Ltd., Albion House, 59, New Oxford Street, London, W.C.1.

LEO (design). No. 698,737. Class 9. Electronic calculating apparatus and parts thereof included in Class 9.—J. Lyons & Co., Ltd., Cadby Hall, London, W.14.

12th October

RED ROSE. No. 699,198. Class 7. Portable electric welding machines and parts and fittings therefor, all included in Class 7.—G. K. Lancaster (London), Ltd., 50, George Street, Croydon, Surrey.

HYDEL. No. 699,417. Class 7. Electro-magnetically actuated mechanisms for use in hydraulic systems in the control of aircraft, land craft, water craft and in industrial installations.—Dowty Equipment, Ltd., Arle Court, Cheltenham, Glos.

FERNBROOK. No. B697,681. Class 8. All goods included in Class 8.—Arvin Electric, Ltd., 37–40, Fernbrook Avenue, Southend-on-Sea.

ACTIVETTE. No. B699,118. Class 9. Electrical apparatus for re-energizing dry batteries.—Amplion (1932), Ltd., 230, Tottenham Court Road, London, W.1.

CYCLOREL. No. 699,316. Class 9. Electronic devices for the operation and control of resistance welding apparatus.—Ateliers de Constructions Electriques de Charleroi, Brussels, Belgium. Address for service, c/o Feeny & Feeny, 24, Charlwood Place, Westminster, London, S.W.1.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Metal Industries, Ltd.—In the course of his speech at the annual meeting held on 12th September Sir J. Donald Pollock (chairman) said that their electrical switchgear companies last year had a higher production, although the increase in earnings was offset by increased costs. Their efforts to reduce delivery periods to meet the large and ever-growing order books might be hampered by shortages of materials. The mechanical engineering companies, although experiencing fluctuations in output, rising costs and other upsetting factors, closed the year with an improving trend, and the metals division had a favourable year.

Lancashire Dynamo Holdings, Ltd., announces that as the accounts will not be completed by the first week in April, 1952, and the final dividend will be paid later than is usual, it has been decided to pay an interim dividend of 4 per cent, less tax, on the ordinary including the new bonus stock. This is equivalent to 8 per cent before the bonus issue. The directors state that in the present circumstances it is anticipated that the interim together with the final dividend will not exceed the total dividends paid for the previous year. Resolutions increasing the capital to £1,310,000 by the creation of 650,000 £1 ordinary stock and to effect the one-for-one scrip bonus were passed at a meeting held on 11th September.

Associated Electrical Industries, Ltd., has announced an interim dividend of 7½ per cent, less tax, on the ordinary stock. The directors state that the object in paying a higher interim dividend, as compared with 5 per cent in 1950, is no other than to divide the total dividend payment between interim and final in more suitable proportions.

Hilger & Watts, Ltd., are issuing a further £100,000 5 per cent debenture stock to debenture stockholders at par in the proportion of £50 of new stock for every £100 held. The issue, which is being made to finance the completion of the pilot factory at Debden, has been underwritten by C. M. W. Trust and Cazenove Akroyds & Greenwood & Co.

The Madras Electric Tramways (1904), Ltd., is deferring the dividend for the half year to 30th June on the 6 per cent cumulative preference until the results for 1951 are available. No dividend has been paid on the ordinary (all of which are held by the Madras Electric Supply Corporation) since the distribution of 10 per cent in respect of 1947.

The Watford Electric & Manufacturing Co., Ltd., has declared an interim dividend of 5 per cent (same). The new ordinary issue made in June last is entitled to half only of any dividend, interim or final, paid in respect of 1951.

A. Reyrolle & Co., Ltd., are paying an interim dividend of 7½ per cent (same).

A. H. Hunt, Ltd., have declared an interim dividend of 7½ per cent (unchanged).

New Companies

B. W. Radio Service, Ltd.—Registered 10th September. Capital £2,000. Radio and television engineers, etc. Directors: R. N. Balmforth and Mrs. Ethel M. Balmforth. Regd. office: 155, Barkerend Road, Bradford.

G. K. Distributors (Ashton), Ltd.—Registered 6th September. Capital £1,000. Wholesalers and retailers of electrical components, etc. Subscribers: Barbara M. Sharp and Joyce Crossley. Regd. office: 11, Fountain Street, Halifax.

Bankruptcy

J. Henderson, lately carrying on business at 82a, Galgate, Barnard Castle, Durham, electrician.—First and final dividend of 1s 2½d payable on or after 26th September at the Official Receiver's offices, 4, Bridge Road, Stockton-on-Tees.

Private Arrangement

J. W. Jones, 144, Conway Road, and Ivy Street, Colwyn Bay, electrical contractor. The creditors were called together when a statement of affairs was presented showing liabilities amounting to £4,792 and net assets of £6,605, leaving a surplus of assets over liabilities of £1,814. It was decided that the matter should be dealt with under a Deed of Assignment in favour of Mr. S. O. Henry, accountant, of Parkin S. Booth & Co., 5, Rumford Place, Liverpool, as trustee of the estate. A committee of inspection was also appointed.

STOCKS and SHARES

STOCK Exchange business in most of the markets is beginning gradually to expand; the reception accorded to the few new issues which are now making their appearance is sufficiently cordial to indicate the amount of money available for investment. Prices keep hard as a whole. The industrial markets have mostly recovered from the weakness which overtook them at the time of the dividend control suggestion, and, since a week ago, rises in price are in the majority.

Lancashire Dynamo Dividends

Last week's declaration of an interim ordinary dividend of 4 per cent by Lancashire Dynamo Holdings includes the new shares resulting from the 100 per cent capital bonus now in course of distribution. It consequently represents 8 per cent on the former ordinary capital of £584,000, on which a year ago the interim dividend rate was 5 per cent. A statement by the board says that the final dividend, which was paid last time in April, will appear later than usual, and in present circumstances the total distribution is not expected to exceed the previous amount. This indicates an 11¼ per cent payment for the year.

Price Changes

Ward & Goldstone, 44s, are 1s 6d better; rises of 1/6 made Siemens 46s 3d, Pye 23s 9d, Reyrolle 83s 9d and Telegraph Construction 45s. Babcock & Wilcox, 78s 9d, are 1s 6d up. Improvements occurred in E. K. Cole, 22s 6d, Cossor, 15s 3d, Hall, 14s, Scottish Cables, 25s, and British Vacuum, 18s 3d. Scophony Baird have gained 6d, at 1s 9d. Tube Investments, 6 7/16, Henleys, 23s, Vactric, 9s 6d, Marconi Marine, 34s, are easier.

Dividend Control

The possibility of dividends being frozen for three years has ironed out to only a small extent the differences which ordinarily exist between the investment returns available from one share and another. It may be that the translation of the control measure from being a proposal into a fact will bring yields closer to uniformity; but, as matters stand now, share prices still give practical recognition to such normal investment considerations as the earnings cover for the dividend, the financial resources, and the trading prospects of the company concerned. Thus, C. A. Parsons shares, with noteworthy qualifications in such respects, still stand on a yield basis of 3 per cent at their present price of £5. Reyrolles at 83s 9d show only just over 3½ per cent. Both companies would apparently be limited, under the control plan, to the 15 per cent rate of dividend paid on the last two occasions.

Discrepancies

The idea that some further adjustment of present share prices might take place on the passing of a dividend control Bill is suggested by minor discrepancies which exist to-day but might not survive on a three years' view. The market calls attention to the fact that on the basis of the last paid dividends, A.E.I. and English Electric ordinary both pay about £4 12s 0d per cent on the money. Reduction of the dividends to the average of the last two payments would leave the yield on the former at just over 4 per cent; but on English Electrics it would fall to about £3 17s 0d per cent. Siemens would give a similar return on the "controlled" rate, while G.E.C. shares would still pay over 4½ per cent in the same circumstances. It is generally considered that differentials will continue to be markedly maintained, even if circumstances tend to narrow them.

Debenture and Preference Stocks

Under the influence of the gilt-edged market, there has been little recent change in the terms of investment in industrial prior-charges. First-class industrial debentures with fixed redemption terms are quoted on much the same basis as the "undated" Government stocks. A line of English Electric 4 per cent debentures, redeemable 1965–85, is currently available, for instance, at a fraction below par. Preference shares in the most popular class, for which the qualifications are unimpeachable security and a price near par, are quoted to yield around 4½ per cent. G.E.C. 4½ per cent "C" preference are offered at par, while A.E.I. 4½ per cents at 20s 9d pay £4 6s 9d per cent on the money. Yields of about 4½ per cent are available from Enfield Cables 4½ per cent preference at par, Hackbridge & Hewittic 4 per cents at 17s 6d, B.I.C. "sixes" at 26s 6d and Laurence Scott 4¼ per cents at 18s 9d.

Higher Yields

The recently-marketed 7 per cent preference shares of Wolf Electric Tools are available at present at 25s, to yield £5 12s per cent. Brush Electric 5½ per cents can be bought at par. Returns in the neighbourhood of 5 per cent are shown by Sterling Cable 4½ per cent redeemable preference at 18s, Ferranti "sevens" at 28s 3d, Reliance Clifton Cables "fives" at par and Aberdare Cables (S. Africa) 5½ per cents. About the 4¾ per cent yield mark are Plessey 5½ per cent preference, at 23s. Some of the higher-priced issues, such as the 7½ per cent preferences of London Electric Wire and Enfield Cables, give returns of £4 17s per cent at the present quotation of 31s per share.

Accommodation for Employees

Recovery of Premises by Employers

By F. E. SUGDEN, A.C.I.S., Barrister-at-Law

THOSE who have a leasehold house and business premises the net rateable value of which is £100 in London, £90 in Scotland and £75 in the Provinces are protected by the Rent Restriction Act. Business people who lived away from their shop were formerly protected by the Rent Restriction Act for their own residences, the Landlord and Tenant Act, 1927, for their shop premises and now a new Act, the Leasehold Property (Temporary) Provisions Act, protects anybody who is threatened with eviction from his shop premises and who cannot claim protection for that portion of his premises under the Rent Restriction Act.

There is another case, that is, where a firm employs a manager for a depot and that manager lives over the premises and nominally would be protected by the Rent Restriction Act. In this case the employers could eject him, upon ceasing to be employed by the firm, on the grounds that the accommodation was needed for his successor. That had been decided by case law, that is, judicial decision and not the Rent Restriction Act itself.

It is often necessary for employers to provide accommodation for their employees owing to the housing shortage, and there has also been a tendency for one company to use the housing accommodation owned by a subsidiary concern to meet the housing shortage in a particular area. This arrangement has been upset by a decision recently made in the Court of Appeal.

Conditional Tenancy

Briefly the facts were these:—A tenancy agreement relating to a house-shop which was controlled by the Rent Restriction Act contained a clause providing that the tenancy was conditional on the tenant being and remaining in the employment of some other firm and that the determination of that employment from any cause whatsoever should terminate the tenancy. The landlords and the company employing the tenant were associated companies, but neither was acting as agent for the other. The tenant later left the employment and as a consequence the landlords claimed possession of the living portion of the shop on the grounds that the tenant had broken an "obligation of the tenancy" as laid down by the Rent Restriction Act.

Appeal Court's Decision

This case went to the Court of Appeal which ruled that the obligation in this agreement was not constructurally an obligation on the tenant but something collateral to the tenancy, that is, something apart from the tenancy agreement, namely, a contract of employment of another firm. Consequently the undertaking by the tenant to remain in the premises of this other firm was not an obligation of the tenancy under the Rent Restriction Act and therefore the landlord was not entitled to possession of the premises.

To understand this case more clearly, one should remember that the Rent Restriction Act was passed to protect the tenant and regulate the relationship between landlord and tenant; therefore, obligation of tenancy must be distinctly limited to the relationship between the tenant and his immediate landlord. Any extraneous matter, such as a contract of employment (as in the case quoted), is held to defeat the object of the Rent Restriction Act.

To sum up the position, obligation of tenancy exists only between the tenant and his landlord and if the immediate landlord employs the tenant, then he can obtain recovery of possession of the premises, in order to put in his place another tenant whom he desires to employ in the business. He cannot, however, put in another tenant who is some other person's employee; the fact that the companies are related to one another or jointly owned does not alter the position.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) will be obtainable after 31st October from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

1465. Murphy Radio, Ltd., Davies, K. S., and Hawkins, G. F.—Method of and means for discriminating between electrical impulses. 5th November, 1947. (660091.)

1945

5124. Comptoir des Cendres et Metaux Precieux, and Klein, S.—Method and device for transforming waves of audible, ultra-audible or infra-audible frequencies into modulations of an electric current and conversely. 1st March, 1945. (659796.)

17626. Akt.-Ges. Brown, Boveri & Cie.—Current convertors. 10th July, 1945. (660093.)

28729. British Thomson-Houston Co., Ltd. (General Electric Co.).—Thermionic electron-discharge devices. 30th October, 1945. (659797.)

28730. British Thomson-Houston Co., Ltd. (General Electric Co.).—X-ray tubes. 30th October, 1945. (659798.)

1946

1314. James, I. J. P.—Pulse-operated thermionic valve apparatus, such as for example frequency dividers, electrical counters and the like. 13th December, 1946. (659799.)

36725. Westinghouse Electric International Co.—Manufacture of fluorescent lamps. 12th December, 1946. (660096.)

1947

4737. Akt.-Ges. Brown, Boveri & Cie.—Magnetic induction accelerators. 18th February, 1947. (Addition to 654939.) (659804.)

12085. Standard Telephones & Cables, Ltd., and Reeves, A. H.—Electric discharge tubes. 30th April, 1948. (659805.)

12490. Philips Lamps, Ltd.—Manufacture of thin wires, filaments or strips of electrically conductive material. 8th May, 1947. (659992.)

12769. Standard Telephones & Cables, Ltd., and Reeves, A. H.—Electric pulse modulators. 7th May, 1948. (659806.) 12770. Electric wave amplifiers. 7th May, 1948. (659807.) 12771. Electric pulse repeaters. 7th May, 1948. (659808.)

13723. Radio Corporation of America.—Electron-discharge tubes. 21st May, 1947. (659993.)

14876. Standard Telephones & Cables, Ltd., and Reeves, A. H.—Electric pulse translator circuits. 4th June, 1948. (659809.)

17184/5. General Electric Co., Ltd., and Espley, D. C.—Electric filter circuits. 22nd June, 1948. (Cognate application 20293, 28th July, 1947.) (659811/2.)

19340. British Thomson-Houston Co., Ltd.—Electric valve control circuits. 18th July, 1947. (659996.)

24098. Philco Corporation.—Receivers for angular velocity modulated waves. 1st September, 1947. (659814.)

24270. Vickers, Inc.—Alternating current commutator machines. 3rd September, 1947. (660106.)

25063. Standard Telephones & Cables, Ltd.—Electron-velocity modulation discharge devices. 12th September, 1947. (660107.)

25950. British Thomson-Houston Co., Ltd.—Magnetic induction accelerators. 24th September, 1947. (660108.)

27393. Cooke-Yarborough, E. H.—Distributing circuits and amplitude-discriminating circuits. 7th October, 1948. (659819.)

29499. Standard Telephones & Cables, Ltd., and Lambert, D. E. C.—Frequency-modulated oscillation generators. 29th October, 1948. (660191.)

31558. British Thomson-Houston Co., Ltd.—Ultra-high-frequency electron-discharge devices. 28th November, 1947. (659820.)

1948

3892. British Thomson-Houston Co., Ltd.—High-frequency apparatus. 10th February, 1948. (659827.)

4262. Standard Telephones & Cables, Ltd., and Rogers, D. C.—Radio receivers. 11th February, 1949. (660192.)

5615. Soc. Electro-Mecanique de l'Aveyron.—Devices for regulating dynamo-electric machines. 25th February, 1948. (Cognate application 5616, 8th December, 1947.) (660123.)

9627. General Electric Co., Ltd., and Clack, B. N.—Low-pressure electric discharge lamps. 29th March, 1949. (660000.)

18577. Smith, J. B.—Pulse generating apparatus. 28th June, 1949. (659830.)

20351. British Thomson-Houston Co., Ltd.—Fibrous dielectric compositions. 30th July, 1948. (660010.)

21991. Russell, G.—Electronic amplifiers. 25th August, 1949. (660193.)

22934. Robertshaw-Fulton Controls Co., and Dixon, M. G.—Electric control systems for fluid fuel burners. 31st August, 1948. (Addition to 601,739.) (660195.)

24408. Standard Telephones & Cables, Ltd.—Two-way time-sharing electric communication system. 17th September, 1948. (660138.)

24915. Philips Electrical, Ltd.—Systems for automatic frequency control. 23rd September, 1948. (660139.)

25678. Smitsvonk, N. V.—Low-tension ignition spark plug for condenser discharge. 1st October, 1948. (660016.)

26178. British Thomson-Houston Co., Ltd.—Operating circuits for electric discharge lamps. 7th October, 1948. (660140.)

26694. Houilleres du Bassin du Nord et du Pas-de-Calais.—Gas-tight frame support for electric lamps of tubular form. 16th October, 1948. (Cognate application 26695, 7th September, 1948.) (660020.)

27037. Patelhold Patentverwertungs & Elektro-Holding Akt.-Ges.—Automatic receiver tuning in multi-channel transmission systems. 18th October, 1948. (660023.)

30813. Troughton & Young, Ltd., and Flood, J.—Cable and pipe supports. 26th November, 1948. (660026.)

31354. Standard Telephones & Cables, Ltd.—Facsimile transmitting means and method of using same. 9rd December, 1948. (660029.)

32097. Marconi's Wireless Telegraph Co., Ltd.—Variable inductance coupling devices. 11th December, 1948. (660217.)

32374. Soc. Anon. de Telecommunications.—Coil winding machines. 14th December, 1948. (660218.)

32458. Lumalampan Aktiebolag.—Connecting arrangement for series-connected electric discharge tubes. 15th December, 1948. (660219.)

1949

454. Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges & Camargue.—Electrolytic polishing and brightening of aluminium and its alloys. 7th January, 1949. (659893.)

499. Philco Corporation.—Deflection circuits for cathode-ray tube apparatus. 7th January, 1949. (660032.)

987. **British Thomson-Houston Co., Ltd.**—Control systems for dynamo-electric machines. 13th January, 1949. (659895.)

1011. **S. Smith & Sons (England), Ltd., Ellis, J. W., and Phillips, K. R.**—Mechanism for controlling the direction of rotation of synchronous electric motors when starting. 29th December, 1949. (660223.)

1898. **General Electric Co., Ltd., and Donelan, J. A.**—Electric arc welding. 1st February, 1950. (659900.)

2594. **Westinghouse Electric International Co.**—Electric circuit-interrupters having arc extinguishing arrangements. 31st January, 1949. (660047.)

3089. **Forges & Ateliers de Constructions Electriques de Jeumont.**—Alternating current commutator machines. 4th February, 1949. (Cognate applications 3090, 26th April, 1948, and 3091, 20th September, 1948.) (659903.)

3164. **Metropolitan-Vickers Electrical Co., Ltd.**—Liquid-sealed glands for the rotatable shafts of hydrogen-cooled dynamo-electric machines. 23rd January, 1950. (660051.)

4679. **Philips Electrical, Ltd.**—Devices comprising a shaft which is adapted to be locked in a predetermined position by one or more movable pawls arranged at the side of the shaft. 21st February, 1949. (660057.)

6397. **Morris Motors, Ltd.**—High-frequency induction heating apparatus. 6th March, 1950. (660241.)

6577. **Siemens Bros. & Co., Ltd., Hards, E. J., and Leslie, J. D.**—Electric selecting switches. 10th March, 1949. (660245.)

6592. **Naamlooze Vennootschap Philips' Gloeilampenfabrieken.**—Protecting devices for gas- or vapour-filled controlled discharge tubes. 10th March, 1949. (659914.)

7015. **James, I. J. P.**—Pulse generating apparatus and television apparatus in which pulse generating apparatus is utilized. 13th December, 1946. (Divided out of 659799.) (659837.)

7089. **Metropolitan-Vickers Electrical Co., Ltd.**—Frequency multiplying circuits. 15th March, 1949. (659838.)

7360. **Metropolitan-Vickers Electrical Co., Ltd.**—Casting of metals. 21st February, 1950. (659918.)

7445. **British Thomson-Houston Co., Ltd., Clark, L. J., and Pitstow, D. J.**—Alternating current generators. 5th February, 1950. (660064.)

7495. **Rosenfeld, M.**—Electrical contact device for transformers and the like. 18th March, 1949. (660247.)

7453. **British Insulated Callender's Cables, Ltd., and Bryce, S. J.**—Earth clamps for electric wiring systems. 17th March, 1950. (659920.)

7841. **Ekco-Ensign Electric, Ltd., and Stickley, W. A.**—Starting and operating a plurality of serially connected discharge lamps. 22nd March, 1950. (659921.)

7957. **Icxi, J. J. G.**—Electrolytic apparatus using pad electrodes. 23rd March, 1949. (Cognate application 7958, 24th November, 1948.) (659922.)

7970. **British Insulated Callender's Cables, Ltd., Richardson, A. B. F. G., Tunnicliffe, E., and Fisher, I. K.**—Extrusion machines. 22nd March, 1950. (660249.)

8081. **British Thomson-Houston Co., Ltd., and Wood, C. W.**—Lamp sockets for electric discharge lamps. 8th March, 1950. (659923.)

8573. **Hackbridge & Hewittic Electric Co., Ltd., and Wells, R.**—Mercury arc rectifier systems. 10th March, 1950. (660065.)

8743. **Pye, Ltd., and Bentley, L. F.**—Apparatus for stripping the insulation from the end of an insulated electric wire. 30th March, 1950. (659843.)

9799. **Akt.-Ges. Brown, Boveri & Cie.**—Arranegment for regulating the speed of electric motors intended to operate with two different ranges of speed. 11th April, 1949. (659938.)

10904. **Edison Swan Electric Co., Ltd., and King, K. W.**—Directional aerials. 3rd February, 1950. (659853.)

11329. **Philips Electrical, Ltd., and Boosman, H. B. R.**—Generation of electric oscillations. 28th April, 1949. (660068.)

12325. **Westinghouse Electric International Co.**—Electric motor control systems. 9th May, 1949. (659945.)

12610. **Thorn Electrical Industries, Ltd.**—Method of purifying di-ammonium phosphate. 11th May, 1949. (659864.)

13413. **Plessey Co., Ltd.**—Phase-modulating circuits. 4th May, 1950. (659868.)

14948. **Brush Development Co.**—Electro-mechanical transducers employing dielectric elements. 3rd June, 1949. (659869.)

15233. **Oesterreichisch-Alpine Montanges.**—Manufacture of steels particularly free from occlusions in a basic electric furnace. 8th June, 1949. (659955.)

16091. **Franco-British Electrical Co., Ltd., and White, E. W.**—Display devices. 11th May, 1950. (660176.)

16568. **Gwatkin, J. S. (Black & Decker Manufacturing Co.).**—Electromagnetic strain gauge. 22nd June, 1949. (659963.)

16811. **Westinghouse Electric International Co.**—Gas-turbine power plants of the continuous combustion type. 24th June, 1949. (660178.)

17545. **Czechoslovak Metal & Engineering Works, National Corporation, and Votruba, K.**—Magnetic amplifiers. 2nd July, 1949. (660179.)

18523. **Soc. Savoisienne de Constructions Electriques.**—Safety devices for electric transformers. 13th July, 1949. (660181.)

18950. **Schweizerische Lokomotiv-Und Maschinenfabrik.**—Piezo-electric means for converting pressure variations. 19th July, 1949. (660182.)

19107. **Dubilier Condenser Co. (1925), Ltd. (Bailey, J. T.).**—Electrical measuring bridge circuits. 20th July, 1949. (659880.)

21839. **Allmanna Svenska Elektriska Aktiebolaget.**—Arrangement in lighting control systems, especially stage lighting systems, for extinguishing lamps having abnormally low rated output. 23rd August, 1949. (Cognate application 21840, 18th March, 1949.) (659888.)

22386. **Dubilier Condenser Co. (1925), Ltd.**—Electrical capacitors. 29th August, 1949. (659889.)

23686. **Philips Electrical, Ltd.**—Electric valve holders. —14th September, 1949. (660187.)

23844. **Marconi's Wireless Telegraph Co., Ltd.**—Test apparatus for testing radar system. 23rd May, 1950. (659969.)

24655. **Philco Corporation.**—Electric wave superregenerative systems. 1st September, 1947. (Divided out of 659814.) (659858.)

26444. **British Thomson-Houston Co., Ltd.**—Electrical conductors. 14th October, 1949. (659977.)

28077. **British Thomson-Houston Co., Ltd.**—Pressure gauges. 2nd November, 1949. (660189.)

29663. **De Sherbinin, W. N.**—Electric lamp supports. 19th November, 1949. (659984.)

30431. **Pirelli Soc Per Azioni.**—Stop joints for oil-filled electric cables. 28th November, 1949. (660071.)

30588. **Westinghouse Electric International Co.**—Motor control systems. 29th November, 1949. (659986.)

31425. **British Thomson-Houston Co., Ltd.**—Thermal control for heating devices. 7th December, 1949. (660077.)

31847. **British Thomson-Houston Co., Ltd.**—Glass fibre reinforced crepe paper and methods of manufacturing the same. 12th December, 1949. (659989.)

31955. **Le Moine, H. C., and Bamber, T. L.**—Electric switch for operation by spring alarm clocks. 13th December, 1949. (660078.)

32040. **Westinghouse Brake & Signal Co., Ltd.**—Photo-electric cells. 14th December, 1949. (659990.)

32781. **Metropolitan-Vickers Electrical Co., Ltd.**—Electric transformer apparatus. 21st December, 1949. (660085.)

33371. **British Thomson-Houston Co., Ltd.**—Electric induction devices, particularly transformers. 30th December, 1949. (660089.)

33378. **Svenska Turbinfabriks Aktiebolaget Ljungstrom.**—Method of operating a steam power plant comprising a gas turbine or other heat-engine producing exhaust-gases, a steam producer and a steam turbine with associated condenser. 30th December, 1949. (660090.)

1951

2218. **General Electric Co., Ltd., and Espley, D. C.**—Electric filter circuits. 22nd June, 1948. (Divided out of 659811.) (Cognate application 2219, 28th July, 1947.) (659863.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—30th January. New South Wales Railways. Electric train equipments for the inter-urban and suburban electrified lines. (See this issue.)

BRISBANE.—21st November. State Electricity Commission of Queensland. Supply of 22 kV small distribution type transformers for the Cairns Regional Electricity Board. (C.R.E. (I.B.) 70313/51. Ten/2943.)*

SYDNEY. — 25th October. County Council. Current limiting reactors for Bunnerong power station. (C.R.E. (I.B.) 70265/51. Ten/2948.)*

Brighton. — 31st October. Town Council. Installation of new passenger lift at Town Hall. Borough surveyor, 26-30, King's Road.

Carlisle.—3rd October. Corporation. Electrical installation at Harraby Infants' School. (See this issue.)

Castle Ward (Northumberland). — 24th September. R.D.C. Electrical installations in 28 brick houses at Ponteland. G. E. Dimmack, surveyor, North Road, Ponteland.

Durham.—28th September. County Council. Electrical installations in five pairs of police houses in Duckpool Lane, Whickham. County architect, Court Lane, Durham.

Edinburgh. — North of Scotland Hydro-Electric Board. 11 kV and lower voltage wood pole lines. (See this issue.)

Exeter.—1st October. Devon Mental Hospital Management Committee. Rewiring Digby (Mental) Hospital. (See this issue.)

Houghton-le-Spring (Co. Durham).—8th October. U.D.C. Supply and erection of reinforced concrete lighting columns and fittings in connection with the conversion from gas to electric lighting along part of Road A.182. W. H. Smith, surveyor.

Hull.—26th September. City Council. Installation of electricity in aged persons' hostel, St. Luke's Street. City architect, Guildhall.

1st October. Corporation and Haltemprice U.D.C. Watertight flameproof lighting fittings, ventilating plant, and heating and hot-water service installations for West Hull and Haltemprice main drainage pumping station. (See this issue.)

Isle of Ely.—22nd October. County Council. Electrical installation in the new Chatteris Infants' school. (See this issue.)

Largs.—29th September. Burgh Council. Sodium and fluorescent street lighting installation. (See this issue.)

New Zealand.—WELLINGTON.—5th February, 1952. State Hydro-Electric Department. One 10,000 kVA 11 kV synchronous condenser for Invercargill substation. (C.R.E. (I.B.) 70094/51. Ten/2929.)*

Sleaford.—9th November. Kesteven County Council. Electrical work at Grantham Technical School. (See this issue.)

ORDERS PLACED

Denbighshire.—County Council. Electrical installation work at the proposed home for unmarried mothers at Bersham Hall (£389).—C. Bowdler (Wrexham).

Durham. — County Education Committee. Electrical installations at schools: Langley Park Modern, alterations and additions (£3,919).—R. Robson, Willington. Washington Alderman Smith Grammar, additions (£816).—F. Reid, Ferens & Co., Ltd., Newcastle. Jarrow Croft Terrace Modern (£1,913).—Morris & Smiles, Wallsend (in lieu of tender withdrawn).

Manchester.—Housing Committee. Electrical installations in about 225 houses, flats and aged persons' dwellings at Wythenshawe.—F. W. Cole & Sons; A. E. Sudlow & Co., Ltd.

Newcastle-on-Tyne.—City Council. Replacement of gas lighting by electricity in 67 houses on the Pendower estate (£1,357).—Dougal & Railton.

Swindon.—Oxford Regional Hospital Board. Recommended. Electrical work for the new operating theatre at Victoria Hospital, Swindon (£1,711).—Southern Electricity Board.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick.—Houses (32) at Howling Lane East for the U.D.C.; G. Beaty, surveyor.

Billingham-on-Tees.—Houses (96), Roseberry estate (No. 4 site) for U.D.C.; S. Coates, Ltd., builders, North Ormesby, Middlesbrough.

Birmingham.—Block of slipper baths, Heath Street, Winson Green (£40,000); H. J. Manzoni, city engineer, Civic Centre.

Additional storey at Chemical Laboratory, Holliday Street; city engineer.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Bracknell.—Houses (600) for Development Corporation; Architect's Dept., Farley Hall, Binfield, Berks.

Brentford.—Factory and offices, for H. Band & Co., Ltd., parchment and vellum manufacturers, High Street; Dodge & Reid, architects, High Street, Brentford.

Cardiff.—Houses (136), on five sites, for R.D.C.; S. P. Youldon, surveyor, 20, Park Place, Cardiff.

Cheltenham.—Nineteen shops with dwellings over; borough surveyor, Municipal Offices.

Darlington.—Factory and office additions at Aycliffe for the Crowborough Engineering Co., Ltd.; Holland & Hannen and Cubitts, Ltd., builders, Wallsend.

Development plan for the Skerne Park estate providing for 440 houses and 12 shops; Delahope, Ltd., builders and contractors, Fawcett Street, York.

Doncaster.—Shops and flats, Cantley; estates surveyor, 15, South Parade.

Easington. — Houses (16), Hesleden and Murton; R.D.C. surveyor.

Eastbourne.—Houses (42), Chatfield estate; T. J. Braybon & Son, Ltd., builders, Princes House, North Street, Brighton.

East Midlands.—Pithead baths, etc., at 20 collieries; East Midlands Division, National Coal Board, Sherwood Lodge, Arnold, near Nottingham.

Ellesmere Port.—Civic hall (£100,000) for U.D.C.; Gornall, Kelly & Shelton, architects, 69, The Albany, Liverpool.

Eston (Yorks).—Houses (75), Granville Road estate, for U.D.C. Builders: W. J. Emmerson, Middlesbrough (43) and A. Payne, Redcar (32).

Failsworth.—Houses (28), Greaves Avenue extension, Propps Hall estate; U.D.C. surveyor, Town Hall, Oldham Road.

Gateshead.—Houses (50), Cedars estate; chief architect, Municipal Buildings.

Glossop.—Houses and flats (52), Acre Street site; J. E. Beardshaw & Partner, architects to T.C., 186, Oxford Road, Manchester, 13.

Guildford.—Dwellings, Longacre Ash (56), Sandmore, Send (16) and Rickford Hill, Worplesdon (4); J. W. Wilton, R.D.C. surveyor, Millmead House, Guildford.

Halesowen.—Houses, Fatherless Barn estate, Cradley. Builders: Shaw Bros. (16) and C. Burkes (24).

Harlow.—Factory; Kores Manufacturing Co., Ltd., 231, Stoke Newington Road, N.16.

Hastings.—First stage of primary schools, Tivoli; borough surveyor, 37, Wellington Square.

Ipswich.—Factory additions; Burton, Son & Sanders, Ltd., refined sugar manufacturers, College Street.

Kidderminster.—Houses (26), Arley Lane, Shatterford; A. T. & Bertram Butler, architects to R.D.C., 31, Priory Street, Dudley.

Leeds.—Ambulance station, Saxton Lane; city architect.

Liverpool.—Factory, Brookfield Drive, Fazakerley; Lodge Plugs, Ltd., Rugby.

London.—Dulwich.—Dwellings (108), Croxted Road and Acacia Grove, for Camberwell B.C.; F. S. Palling, architect, 24, St. Mary Axe, E.C.3.

Holborn.—Works and offices, Hatton Garden; Priestley & Moore, Ltd., 57, Hatton Garden, E.C.1.

Park Royal. — Physiotherapy department at Central Middlesex Hospital; North West Metropolitan Regional Hospital Board, 11, Portland Place, W.1.

Loughborough.—Out-patients' department at General Hospital; Vallance & Westwick, architects, White Hart Chambers, Mansfield.

Macclesfield.—Houses (300), Hurdsfield area; borough architect.

Malvern. — Houses (82), Cockshott Road; Wheeler & Mansell, Ltd., builders, Lime Street, Evesham.

Manchester. — Library, Rochdale Road, Queen's Park, and public wash-house, Openshaw; city architect.

Millom.—Houses (66) on six sites; J. Hankey, R.D.C. surveyor, Market Square.

New Cumnock.—Nurses' home at Glenafton Hospital; James Hay & Steel, architects, 13, West George Street, Kilmarnock.

Northants.—New schools, Kettering Grammar (first section), Moulton Modern and Rothwell/Desborough Modern, and extensions to Brackley Magdalen College Controlled, Corby Technical, Rushden North End Modern, and Rushden Tennyson Road Modern; county architect, County Hall, Northampton.

Norwich. — Dwellings (186), North Park Avenue site; city architect, City Hall.

Pontypool.—Works extensions for British Nylon Spinners, Ltd.; Sir Percy Thomas & Son, architects, 10, Cathedral Road, Cardiff.

Purfleet.—Office block for Thames Board Mills, Ltd.; F. G. Minter, Ltd., builders, 4, Buckingham Gate, S.W.1.

Rock Ferry. — Works extensions, Bromborough Port, for Van Den Berghs & Jurgens, Ltd.; staff architects, Lever Bros. & Unilever, Unilever House, Blackfriars, London, E.C.4.

Rutherglen.—Flats (56), Croftfoot Road; burgh surveyor.

Salford.—Flats (66), Islington Street; city engineer.

Sheffield.—Factory and offices, Solly Street; Jones & Longbottom, Ltd., manufacturers of table steels, Victoria Street, 3.

Skelton (Yorks).—Houses (22) at Boosbeck; U.D.C. surveyor.

Stone.—Factory premises; Quickfit & Quartz, Ltd., 1, Albemarle Street, W.1.

Wednesfield.—Houses (46), Lichfield Road site; U.D.C. surveyor.

Welwyn Garden City.—Flats (95), for Development Corporation; Louis de Soissons & Partners, architects, Midland Bank Chambers.

Whitley Bay.—Houses (26), Foxhunters' site, for U.D.C.; John Urpeth, builder, North Ridge, Bedlington.

Wigston.—Houses (57), Clarkes Road/Central Avenue estate; Pick, Everard, Keay & Gimson, architects to U.D.C., 6, Millstone Lane, Leicester.